RAILROAD GAZETTE

FRIDAY, NOVEMBER 16, 1900.

CONTENTS

Contributions

The Barschall Joint.

New York, November 7, 1900.

TO THE EDITOR OF THE RAILROAD GAZETTE.

Mr. Schmitz, in his letter published in your issue of Nov. 2, states that I have offered a severe criticism of my design "in stating that the filler becomes polished in service" and further says "that this simply shows that the filler is subjected to a wear it would be better capable of resisting were it of different shape."

The "wear" of the filler is so trifling that it has never been considered, as after nine years' service in track they are still serviceable; while to change the shape would take from the joint one of its strongest points, for reasons clearly explained in my letter appearing in your issue of Oct. 12.

The objection of Mr. Schmitz to the wider running surface of the joint is one held by some other experts, but is still a questionable and far from decided objection to most other experts. In Mr. Schmitz's summary as to the nine conditions necessary for an "ideal" rail joint, he concedes that my joint fills the bill for eight of these conditions, and fails in but this one—a still doubtful necessary condition.

In an article on rail joints published in the *Zeitschrift fur Architektur und Ingenieurwesen*, Mr. Ludwig Neumann, an expert of many years' practical experience, has the following to say: "Auxiliary rail joints tested since 1852 have caused their adoption in Saxony, the wider running surface being beneficial, rather than detrimental to worn ties as formerly held." Of joints supporting rail bases he says "even if they are very strong they will not be able to prevent hammering on rail ends as do wheel-carrying joints."

Mr. Neumann's views are proved correct by the *actual* experience of others, such as the Vienna Railroad, of which you published a report May 4. The Kaschau Oderberger road, which adopted my joint some years ago, were so well pleased with it that they are putting in a still larger stretch of them. The Grossherzoglich Mecklenburg Friedrich Franz Bahn two years ago applied my joint to the worn and much hammered rails instead of renewing the rails, and thereby get a prolonged life of rail. These three roads are the only ones using the *rolled* joint which I advocate. The few unfavorable experiences with my joint have, on investigation, proven to be fault of material and not construction or design. The Prussian State Railway has about 7,000 of my joints distributed in numerous sections. Some were put down in 1891 and the balance three or four years later. Most of the engineers in charge of these various sections have put in requisitions for more joints based on their own favorable experiences with them.

If the wider running surface were in practice as objectionable as theory claims, all wheel-carrying joints would be failures; but the last five years' experience with them in Europe proves that this theory cannot longer be maintained.

MAX BARSCHALL.

Draft Gear and Couplers for Heavy Service.

New York, November 12, 1900.

TO THE EDITOR OF THE RAILROAD GAZETTE.

It is apparent that the introduction of heavy steel cars and very heavy locomotives has given to the railroad managers of the country a problem of great urgency, but with a set of conditions so fortunate as to render a solution thereof less difficult than it would at first appear.

By their united action a form of car coupler and draft gear adequate to meet all possible contingencies can and should be selected and decided upon as a standard for all new cars, and which will also be suitable to replace the hundreds of imperfect and weak kinds now in service.

The experience in the daily use of the many heavy locomotives and thousands of steel cars capable of carrying loads of 50 tons each has shown remarkable economical advantages; and it may thus be expected that notwithstanding the great damage inflicted upon the draft gear and end sills of light wooden cars by reason of the incidental strains and heavier blows, there will be, as indicated by recent contracts, a rapid extension of such heavy equipment.

The difficulties already experienced in the operation of mixed trains have demonstrated that there must be a radical strengthening of the existing draft gear, in order to avoid costly accidents, as well as to insure a reasonable life to the million and more wooden cars in the country, the constant use of which is necessary to meet the demands of an increasing traffic. As an illustration, it may be said that of the cars out of service and awaiting repairs fully 70 per cent. is due to defective draft gear.

As the result of many years' work and of practical experience in the development of friction draft gear, I have come to the definite conclusion that there can now be selected a standard coupler and draft apparatus capable of eliminating nine-tenths of the present losses due to the employment of the present inadequate kinds.

The interests of the manufacturers of couplers might seem to be a chief difficulty to be overcome in the selection of a standard coupler and draft gear; but in these days of agreement between conflicting interests, it should not be troublesome to bring about an exchange of licenses under controlling patents, upon such terms as would insure to each party a proportionate share of the larger business which would inevitably result from the general use of a stronger and heavier type of coupler.

The managers of our great railroads, who have alread achieved so much in other directions for the mutual benefit of the properties in their charge, should be able, if they make the effort, to solve this important problem, and in so doing, would insure further economies of vast importance and at the same time add greatly to the safe working of all of their trains. Will they do so?

GEORGE WESTINGHOUSE.

A Horse-Power.

Paterson, N. J.

TO THE EDITOR OF THE RAILROAD GAZETTE.

In the minds of many engineers and readers of engineering papers there seems to be a confused idea as to what a horse-power really is or means. This has been brought about in part by the published descriptions of a great many widely different steam power plants. There are those who think that a boiler horse-power, engine horse-power, water horse-power, electrical horse-power, each have the same value and are equal to each other, which idea is erroneous as far as the boiler horse-power is concerned in connection with the others mentioned.

A boiler horse-power is an arbitrary expression for rating water evaporation. As adopted by the American Society of Mechanical Engineers it is 30.01 lbs. of water evaporated per hour from 100 deg. F., water temperature, into steam at 70 lbs. gage pressure, or 34.488 lbs. of water evaporated per hour, from and at 212 deg. F., into steam at ordinary atmospheric pressure, either of which is, for all practical purposes, equivalent to $34.488 \times 965.7 = 33{,}305$ T. U. per hour. The mechanical equivalent for a thermal unit is (very nearly) according to Rowland of Baltimore, 778 ft. lbs. of work; John Perry, England, uses 774 ft. lbs. of work; Joule's equivalent is 772 ft. lbs. of work

The term "horse-power" is used in rating boilers for cataloguing purposes of maufacturers and refers to the evaporation to be obtained by use of their boilers, but it has no definite relation to grate area or heating surface.

By *indicated horse-power* is meant the horse-power as measured by the steam engine indicator. The net available power is measured by friction brakes, or by any reliable method of registering or weighing the foot pounds of work done by the engine or motor. An engine horse-power is therefore the measure of net or gross work done by the steam, fluid, or gas in the cylinder or cylinders of an engine or motor. A horse-power of work done by a water wheel, electric motor, steam, gas or oil engine, is measured by the number of foot pounds of work done per minute, 33,000 foot pounds being the nominal horse-power. In electrical measurements 746 watts equals one horse-power. In water power practice a "mill power" is a "unit" used in rating water-power for rental purposes. Different values are given it in various places, some of which are as follows: Lowell and Lawrence, Mass., 85 h.p. as a maximum; Holyoke, Mass., 86.2; Passaic, N. J., 21.2. (See Kent Mech. Engrs. Pocket Book.)

A boiler horse-power may have for any and all types of steam generators one equivalent or value as given above, which, as previously said, is in no way connected with an indicated or engine horse-power. Steam engines whose economy varies, for example, from that of the compound super-heating Schmidt engine (76 i.h.p. at 180 lbs. gage pressure and 380 ft. piston speed) with 10.17 lbs. of steam consumed per i.h.p. per hour, down to the plain slide valve throttling governor engine using 70 lbs. or more of steam per i.h.p. per hour, gives us in the first case approximately ⅓ of a boiler h.p. of steam per i.h.p., and in the second case 7-3 of a boiler h.p. of steam per i.h.p. It is evident that the latter engine requires 7 times as much steam as the former, to produce an i.h.p., and the boiler capacity to generate the same h.p. in the last must be seven times as great as for the first.

It is a common error to think that an equal number of horse-powers in engine and boilers should always exist. They must, of necessity, be entirely independent, as the boiler horse-power required will be much less when very economical engines are used, than when wasteful ones make up an equal engine plant.

W. W. CHRISTIE.

Henry Villard.

Only two months ago we had to chronicle the death of C. P. Huntington, one of the founders of the Southern transcontinental railroad lines, and last Monday died Henry Villard, one of the creators of the Northern Pacific. These two men were the last of the great constructive minds who made the transcontinental railroads. Henry Villard was, it appears, not Henry Villard at all, but Heinrich Hilgard, which fact we imagine must be new to nearly all of our readers.

Hilgard was born in Speyer, Rhenish Bavaria, April 11, 1835, of an old and respectable middle class family. In the course of his schooling he was at Phalsbourg, in Lorraine, where Chatrian helped to teach him the French language, and those who have read the novels of Erckmann-Chatrian will well understand that young Hilgard may have acquired a singularly simple and clear French, particularly as he seems to have had a wonderful capacity for languages. In 1853 he decided to come to the United States, which he did much against his father's will, and with a proper but boyish pride he changed his name to Henry Villard in order that whatever might be his fate he at least should not disgrace the family name. He acquired English very rapidly and in a few years had become so proficient that he was not only an acceptable but even a distinguished newspaper correspondent, having served many newspapers in this capacity with success and having won respect during the civil war for his gallantry and devotion in the line of his duty as a correspondent.

In 1871 he had gone back to Europe, having in hand among other business the negotiation of certain American securities in Germany. This brought him into connection with bankers in Frankfort and Berlin and started him in a brilliant and extraordinary financial career. In 1874 he came back to America empowered to represent here certain owners of railroad securities and went to Oregon, the chief result of that visit being that European bondholders took over the property of the Oregon & California Railroad Company and the Oregon Steamship Company in 1875 and made Mr. Villard President. In the same year he was made Receiver of the Kansas Pacific in the interest of certain Frankfort bondholders. As matters developed in Oregon he bought the stock of the Oregon Steam Navigation Company and in 1879 incorporated the Oregon Railway & Navigation Company, of which he became President and which was at once very successful. An ocean service was established between Portland and San Francisco and a railroad built along the south bank of the Columbia.

Then Mr. Villard turned his attention to the completion of the Northern Pacific, about 1,000 miles of which was yet unbuilt. In the course of the struggles for the control of the Northern Pacific Mr. Villard organized the Oregon & Transcontinental Company to acquire control of the Northern Pacific and of the Oregon Railway & Navigation Company. He began buying Northern Pacific stock privately in December, 1880, and in the following February he organized the famous "blind pool," inviting some 50 persons to subscribe with him to a fund of $8,000,000, and, strange to say, although he revealed his plans to no one, this fund was subscribed twice over in 24 hours. When he was able to make his scheme public he raised $12,000,000 more, and in the following September he was made President of the Northern Pacific. In the summer of 1883 the Northern Pacific was completed, and this event was celebrated by a grand excursion in which Germans, Englishmen and Americans of distinction took part and which is said to have cost something towards $200,000.

Shortly after came disaster. The business depression of 1883 found Mr. Villard and his associates loaded with obligations beyond their power to meet and failure followed, sweeping away nearly all of Mr. Villard's fortune. This episode in his life made him enemies, and for a while he was looked upon by many as having been after all a mere adventurer in the markets; but so far as we can judge this opinion is no longer held by those who have taken the trouble to inform themselves. At any rate, Mr. Villard soon regained the confidence of moneyed men on both sides of the Atlantic, and in 1890 he organized the Edison General Electric Company, of which he

was President for about two years, and which was the beginning of the General Electric Company.

In October, 1889, Mr. Villard accepted the chairmanship of the Board of Directors of the Northern Pacific, but the panic of 1893 was again disastrous to this property, and in the reorganization Mr. Villard's connection with it ceased. We suppose that after his first great failure he never again became very rich, as fortunes now go, but he doubtless was a man of more than ample means. Of recent years he has lived winters in New York and summers at his home near Dobbs Ferry, on the Hudson, where he died.

Mr. Villard was a man of attractive manners and appearance, of taste, of generosity, of imagination and perhaps even of genius. A very appreciative estimate of him appeared in the New York *Evening Post* last Monday, which, of course, was written with intimate knowledge, as his relations with that newspaper were very close. Indeed he had purchased, years ago, a controlling interest in the *Evening Post* and the *Nation*, and established in editorial control there Mr. Godkin, Mr. Schurz and Mr. Horace White, and we suppose that he still owned a controlling interest in the property. Incidentally we may add that he was in early days an occasional contributor to the *Railroad Gazette*. The writer in the *Evening Post* says that Mr. Villard's mind teemed with large ideas and projects and that he had also a rare capacity for details and great observation. He had self-confidence united to a childlike and magnanimous disposition and was devoted to his family and friends. He was not a speculator, but loved to achieve things and held his gains in trust and was most munificent in his gifts to institutions of learning and to other worthy objects.

A Concrete Arch Railroad Bridge.

One of the best examples, in the United States, of pure concrete arch construction applied to railroad work, is the semi-circular, single-barrel arch of 15 ft. radius, recently put in service at Sharpsville, Pa. It is on the Erie & Pittsburgh Railroad, a branch of the Pennsylvania Lines West of Pittsburgh, and is known as bridge 41 on the former road.

Before the erection of the new bridge, the E. & P. R. R. crossed the gully through which Pine Run flows, on a single track trestle 200 ft. long and 45 ft. above the bed of the stream. Inasmuch as the sides and bottom of the ravine were shale of a good quality, the location was ideal for the construction of an arch bridge, whenever the condition of the then existing trestle should make rebuilding necessary.

In the autumn of 1897, during the annual bridge inspection trip, it was decided by the officers of the Pennsylvania company that the trestle was no longer safe for the traffic it was carrying and should be replaced the following year by a 30-ft. arch. Being desirous of determining by experiment the feasibility of pure concrete construction for railway bridges, it was further decided to make the new bridge of the type in question.

To arrive at the best proportions for the new arch, nine assistant engineers of the company were invited to submit plans, specifications and estimates for the structure. A general plan fixing alignment of track, size of barrel, height of springing line and other details, was furnished by the chief engineer's office to insure uniformity.

From the designs submitted the arch shown in Figs. No. 1, No. 2 and No. 3 was built, with practically no change from the original drawings other than to skew the center line 15 deg. This change was not due to a fault in the design, but to a change in track alignment decided on after the drawings were completed.

The design does not materially differ from good practice in masonry work except in-so-far as concrete allows of different manipulation than stone. The dimensions are a little larger than would be the case in stone work and the wing walls are sloping on top instead of stepped. The principal dimensions are shown on the drawings and do not require explanation or comment.

The specifications called for are arch, constructed entirely of Portland cement concrete, made up of the materials and mixed according to the proportions following:

1 part Portland cement.
3 parts sand (clean and sharp).
5 parts broken limestone (from ½ in. to 2½ in., measured by ring). On all exposed surfaces to a depth of 1 in. a mortar was placed, composed as follows:
1 part Portland cement.
2 parts sand.

This mortar was laid in courses with the concrete and not spread afterward, the moulds being erected exactly to the finished size of the structure.

The concrete was mixed, by hand, in batches of half a cubic yard, more or less, according to the following system. The measured amounts of cement and sand were mixed dry, by turning with shovels, after which the measured quantity of broken stone was added and the whole thoroughly mixed, water being sprinkled on the pile as the mixing proceeded. It was required that the concrete, when ready to be placed should not contain enough water to cause it to quake after being thoroughly rammed. The concrete was placed in layers 8 in. thick, perpendicular to the line of thrust, as far as possible. In joining new work to old the latter was required to be thoroughly cleaned and wet.

Before the actual work of construction was begun the bents of the old trestle, interfering with the new bridge, were removed and in their place was erected an old plate girder bridge to temporarily carry the traffic. This span may be seen in some of the engravings.

The actual work of concreting was begun on both footings and wings at the same time and was completed, without moulds, to a point about 4 ft. below the bed of the stream. From the latter point the construction was carried on entirely between moulds built of 2 x 6 in. hemlock studding, sheeted on the inside with ⅞-in. dressed hemlock. Considerable difficulty was experienced, early in the work, in holding the moulds exactly to the correct lines, owing to a tendency to spread when the concrete was tamped into place. To overcome this, the moulds were tied together at frequent intervals with wire. When the moulds were finally removed, the wires were cut off back of the finished face of the concrete and the ends plastered over. This wiring was used in all parts of the arch and proved very satisfactory.

The centers on which the barrel of the arch was erected were, with the exception of those at the ends, placed at right angles to the axis of the arch. The two end ones were skewed 15 deg. By this means all the centers but two were semi-circular and easy to build.

Owing to the height of the track above the top of the arch it was comparatively easy to so arrange the handling of material that its whole course was downward, from the car to its place in the finished structure. For convenience and economy, however, part of the concrete was lifted after being mixed. The water also was pumped by hand pumps from the stream to the mixing platforms. Fig. 4 shows the general arrangement of chutes, platforms, etc. The small chute to the left leads to the cement storage bin, the center one to the crushed stone and the one on the right to the sand. The figure also shows the position of the arch relatively to the then existing track of the E. & P. R. R. The mixing platforms were so located that most of the material could be dropped directly into place after mixing. It was found to be more convenient, however, to wheel the concrete for the top of the barrel than to move the platforms. The top 5 ft. were, therefore, so constructed.

The concrete was put in place in layers 6 to 8 in. in thickness, all parts of the work being maintained as nearly as possible at the same level. When the springing line of the arch was reached, the moulds that had been in use to that point were removed and the centers erected on which the arch barrel was built. Above the springing line the layers of concrete were put in perpendicular to the line of thrust as far as was practicable. Above the latter point, sections 15 ft. to 20 ft. long were closed over the crown each day, so that there were no places where a joint existed except perpendicular to stress. This system, it was thought, would give as satisfactory results as would have been obtained had the specifications been followed. Fig. 4 shows one such section just being closed in at the top.

All labor in connection with the work was done by the Pennsylvania Company. The moulds and centers were built by the Division carpenters and the labor was performed by workmen under the direction of company engineers. The maximum number at work at any time was one foreman, 44 laborers and 5 carpenters. The largest day's work was 57 cu. yds. This was accomplished by a foreman and 32 men at a cost of $0.87 a cu. yd.

Some very cold weather was experienced during the latter part of the work, the thermometer reaching 20 deg. below zero at one time. To prevent freezing salt water,

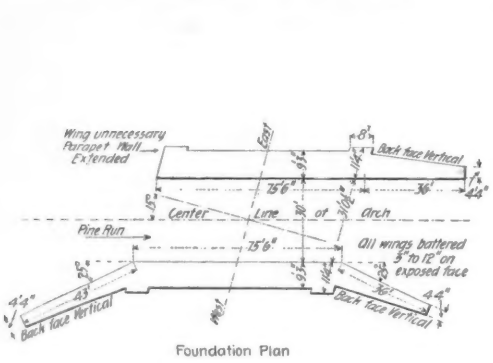


Fig. 1.

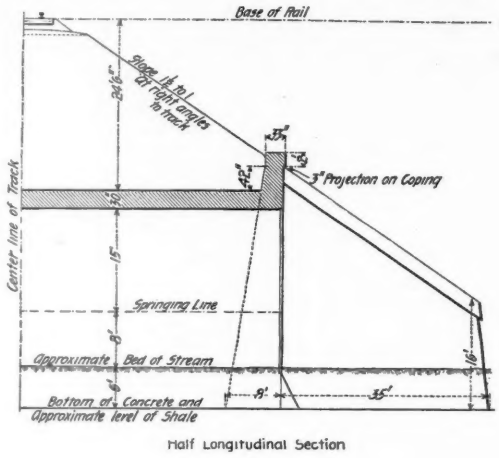


Fig. 2.

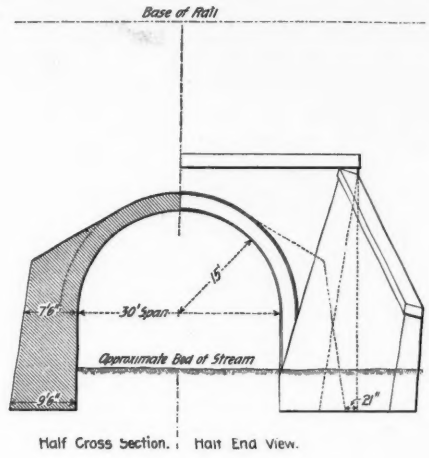


Fig. 3.

The Sharpsville Concrete Arch.

Fig. 4.—General View of Sharpsville Arch from the West, Showing Chutes.

composed of 1 lb. salt to each 16 gals. of water at 32 deg. Fahr., with an additional ounce of salt for each degree below the freezing point, was used in mixing concrete. The above proportion proved entirely successful and no trouble was experienced in handling the concrete at any time, due to cold. There was, however, a very material increase in the cost of work during the cold weather.

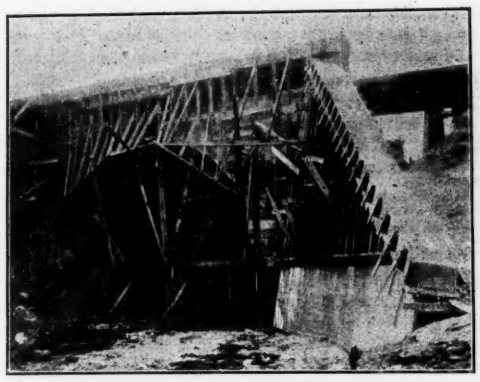


Fig. 5.—View of North End After Completion, But Before Removal of Moulds.

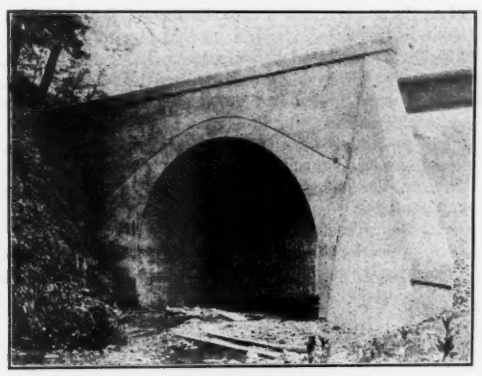


Fig. 6.—Up-Stream End of the Completed Sharpsville Arch.

Fig. 5 shows the up-stream end of the arch after completion, but before the moulds had been removed above the springing line. Fig. 6 shows the same end after the moulds were removed, and Fig. 7 shows the structure complete but unloaded. The false seam shown in the figures was afterward taken out, leaving the surface smooth.

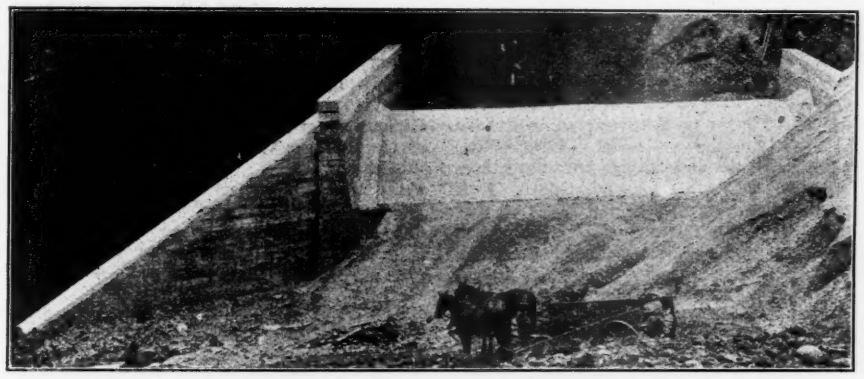


Fig. 7.—Completed Arch, from the West (Sharpsville).

The total cost of the work was approximately $11,500, subdivided as follows.

Mixing platforms, bins, chutes and houses, including material, work train and carpenters	$325	
Moulds and centers, including same as above.	1,450	
Concrete materials	6,850	
Mixing concrete, work train and labor	2,875	
Total cost of arch		$11,500
Total cubic yards of concrete	2,000	
Total cost per cubic yard	$5.75	

The cost of mixing and placing concrete varied from $0.75 to $1.35 a cu. yd., depending on weather and other conditions.

Since early summer the fill over the arch has been completed and trains of the heaviest tonnage handled by the Pennsylvania Company are passing over it daily. No sign of failure has developed in any part of the work, and up to the present time the arch is in every way a success. That it is so reflects great credit on its designer, Mr. I. W. Geer, and on the officers of the Pennsylvania Company who are directly responsible for its being.

Swing-Beam Trucks.

At the October meeting of the New York Railroad Club the following question was introduced for discussion: "Why has the swing-beam truck so largely been abandoned for freight service?" We gave a very short synopsis of the points brought out and now print extracts from the report officially published in the Proceedings of the Club:

Mr. R. H. Soule—This topic was the subject of discussion at a meeting of the Western Railway Club about ten years ago. But, of course, a great deal has happened since then bearing on the main question of the development of trucks and the relative merits of different types. I think the fact was conceded even then, ten years ago, that the swing truck cost more to build and to maintain than the rigid truck did, and I do not think it was disputed that that increased cost of construction and maintenance might easily have been 10 per cent.

One of the claims which had been made in favor of the swing truck I think was disproved, and that was that it was easier on the wheels than any rigid truck could be and this was evidenced by the fact that there were not nearly as many sharp flanges to be found on wheels in swinging trucks as there were in rigid trucks. But I think it might be well to consider that for a moment and to review the facts brought forward in that connection, and I think they simply are that when people get thinking about it they realize that there are at least two influences which conspire to produce sharp flanges and which are entirely independent of the main question of the type of truck; those are, a difference of diameter in the wheels on the same axle, which will invariably crowd the wheel of lesser diameter to the rail, and the fact that some trucks are out of square, which usually forces one side of the rail. Those are two conditions which may exist either in a rigid truck or in a swing truck, as you can readily see. And then another claim that the swing truck gave an easier riding motion than the rigid truck I think has also been disproved largely, and I think the reason there is that the fact is overlooked that the bolster springs themselves in the rigid truck, when they are well proportioned and properly designed for the load and the conditions, serve to yield in such a way as to allow the body to swing on the longitudinal center line of the car and to give an elastic and yielding resistance to the impulses of centrifugal force and all those indefinable impulses and forces which come from irregular track.

Of course, since that time the rigid truck has come before the public in an entirely different shape from the rigid truck that was in mind then, because of the numerous pressed steel trucks which have been very much in use and they are even more rigid in a certain sense than the old rigid type of Master Car Builders' truck; the experience of the country on a large scale with those pressed steel trucks has certainly justified their use, and there is no doubt that they have come to stay.

But the one fact which the persistent advocate of the swing truck would probably bring before you would be that the trucks of passenger cars are still made and probably will continue to be made with a swing-motion feature, and it is a little difficult perhaps to account for that fact; the question was asked ten years ago and it might be asked again "if the swing-motion truck is such a good thing under passenger cars, why isn't it a good thing under freight cars?" One of the answers to this question is that the swing motion of the bolster of a passenger truck is almost invariably limited and also cushioned. I do not suppose any modern passenger truck is made now without bolster end springs in it and also made with a very small clearance between the ends of the bolster and the chafing pieces of the truck. That was not so in freight truck construction. So that the mechanical conditions were quite different in the first place, and in addition to that, of course, we always have the passengers with us and in our minds on railroads, and every concession must be made to their comfort, even if we are compelled to do some things which are only imaginary sources of comfort.

Prof. H. Wade Hibbard—I have always had a rather soft spot in my heart for the well-designed swing-motion truck on both locomotive and car; I have found crooked roads on the other side of the water running eight-driver locomotives over roads so crooked that they had to put curved tunnels into the side of the mountain to get up a grade to prolong their track and they were running those freight locomotives pulling big loads over that crooked road at a high speed without a leading truck. I am sure if I were a railroad man to-day on a straight division I would be tempted to fix up some of my six and eight-wheel switchers so they would not pitch fore and aft and try them on the main line pulling freight and not do as one of our locomotive works in this country has come to do to-day—build eight-driver locomotives and wasting adhesion by putting a four-wheel truck under the front end.

But as to swing-motion trucks for freight cars, I was thinking, when Mr. Soule spoke about our having to consider passengers, that perhaps we might find it wise to consider the comfort of the lading or steel superstructure in our modern freight car; that if there is anything in the swing-motion truck which makes the striking of a reverse curve a little more gentle upon the superstructure of the car that perhaps there might be something in it. The pressed steel trucks, the shaped steel trucks of various forms have given us such wonderful success in keeping square and keeping cool and holding together and all that sort of thing, that perhaps we have, in order to get those advantages, been willing to let our swing-motion pass by.

Mr. L. R. Pomeroy—Some years ago, when it was quite prevalent to use the pressed steel type of truck with pedestal boxes under tenders we found that they were failing very rapidly and continued to do so until the truck was redesigned with a floating bolster which practically made it a swing-motion truck, and now that truck is being very largely used for tenders and is considered to be very successful. That might be an illustration that we are coming back to the swing-motion truck in the most trying service we can possibly get.

Mr. F. W. Brazier—I suppose the reason that we do not use the swing-motion truck to-day is on account of the expense. Something like 15 years ago when the West Shore road was opened and their equipment all came out with rigid trucks, we found it cost much less to keep them in repair and railroad men began to think that they were about the right thing for freight service. Now we have pressed steel trucks and trucks of that kind. I venture to say that we run our repair tracks with 50 per cent. less men for that class of truck than we did when we had the old swing-motion truck. That has been my experience as a car man all the way through. I recollect years ago we adopted a safety iron that was put under all swing-motion freight trucks to catch what some people call the sand plank. If the hanger is broken the safety trap holds up the spring and spring plank from the track, and in many cases saves cars from being wrecked. With rigid trucks we do not have that trouble. I think that is one reason why the rigid truck is used. It is a great expense to maintain swing-motion trucks under freight service. They are not watched like passenger trucks. As fast as the bolsters under our passenger trucks get so that there is ⅜ of an in. play, our men have orders to shim the chafing iron and keep them in good shape, while freight trucks do not get this attention. I have seen 1¼ in. play between the transoms and bolster, and when the air is applied to the car like that it shakes the trucks all to pieces. This has been my experience with swing-motion trucks under freight cars.

As I said before, the trucks we have to-day built of metal are rarely in the shop for repairs, while the old style trucks are constantly in for swing-motion bolsters, swing-motion hangers and other parts. I venture to say that the railroad men here to-night will bear me out that more wrecks are caused by swing-motion hangers breaking down than anything else connected with the trucks. There has been a great deal of trouble with a certain lot of private line cars running over roads with swing-motion trucks. The hangers are breaking constantly. When repairs are made, it seems impossible to ever get a proper hanger or the right size spring applied to the trucks, and joint evidence cards are obtained when car gets to destination. Springs are found to be 1-16 in. large or small. Those in charge of car departments are getting almost tired of hearing complaints. This has been the trouble with swing-motion trucks, so much so that we are getting disgusted with them in freight service.

Mr. M. N. Forney—You have all heard about the doctor who said he could always cure his patient if he could only throw him into fits. I seem to occupy somewhat that position, and to be called upon to throw this audience into fits whenever the discussion lags. The question has occurred to me during this discussion as to whether the reason for abandoning swing trucks is not only that tracks have been improved very much of late years, and that the swing truck is not nearly as essential on good tracks as it is on bad. I think you can readily see that in going around a curve, for example, if there is any material irregularity or defect in the rails so that when the car strikes it suddenly it gives a jar, with the swing-motion truck, the truck itself would move alone without moving the body of the car the same distance, whereas if the track is kept up in perfect alignment a center-bearing truck would answer every practical purpose. I am therefore inclined to think that it is as much a question of track as it is of anything else, and consequently with the improvement in track that has been made of recent years, swing motion is not necessary, whereas in old times it was.

There is perhaps another question that might be asked, too, and that is as to the extent to which swing-motion trucks have been abandoned. Is it a fact that they have been generally abandoned on railroads in freight service?

Mr. Gaines—I would like to say as a matter of information that about two weeks ago I was at the Pressed Steel Car Company's plant at Pittsburgh, when they were building some large 80,000 capacity box cars. They had a steel underframe and wooden top. These cars had a swing bolster.

Mr. G. W. West—In reply to Mr. Forney's question, I would say I thought they were going out of use very generally, and I think one of the strong reasons for that is because they have not been able to survive as the fittest.

I think that railroad men as a rule will indorse all that Mr. Brazier has said with regard to repairs; that if the entire freight equipment was fitted with a swinging bolster, we would not be able to keep up our repairs on any of the roads with the present shop facilities. At a recent meeting of the Central Railroad Club, I asked Mr. Waitt to verify a statement I had heard in regard to the Lake Shore equipment, that while their road was practically a straight one, a large percentage of their wheels were removed for sharp flanges, and he told me, if I remember rightly, that 80 per cent. of the wheels removed from their old equipment were taken out by reason of sharp flanges. I bring this up as a partial answer to the point Mr. Soule raised that it might be said in favor of the swing-motion truck that it overcame the sharp flanges. If it is true that on the Lake Shore equipment with the swing-motion truck 80 per cent. of the wheels removed were removed for sharp flanges, it seems to me the swing-motion truck had to account for the question of sharp flanges.

I would like further to say in answer to the point raised by Mr. Pomeroy that while it is true the Pressed Steel Car Company are making trucks for locomotives with a swinging bolster, they are also making a truck that is being used very successfully under tenders that is not equipped with the swing motion. We have some running under 6,000-gal. tanks without the swing motion, and very satisfactorily.

Mr. E. E. Silk—Mr. West's question as to the excessive flange wear of truck wheels on the Lake Shore & Michigan Southern may be partly answered or accounted for by the very heavy winds which those trains encounter. It is a fact that the Lake Shore freight trains have been frequently stalled by the winds as they sweep up from the lake. We would therefore naturally expect that this flange wear would be caused, not so much from the use of rigid trucks as from the heavy winds acting continuously on one side of the train.

Mr. Brazier—For Mr. Forney's information I would say that many of the refrigerator lines centering in Chicago have adopted a rigid truck in place of swing motion. Swift and Company, I believe, built quite a number of cars with rigid trucks. They formerly used swing motion entirely. And the Armour people the same way. I think all the cars that the Armours build to-day are built with the rigid truck. They formerly had swing-motion trucks, but abandoned them.

Prof. Hibbard—If you will allow me to say a word about the tender truck that has been spoken of two or three times, the one with the leaf springs under the bolster, and the one without those springs—I think it is largely a question of riding, on account of the coiled spring being notoriously quick in its rebound and the leaf spring easy in its rebound.

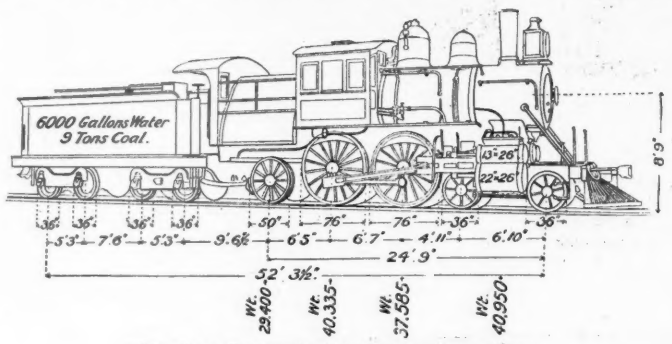
Mr. Pomeroy—I would like to say that there are a large number of rigid trucks in service equipped with elliptic springs.

Mr. Gaines—I would like to say also, referring to the tender truck question again, it is not altogether a question of the firemen. With the very rigid design of truck under tender service, I cannot tell you why it is, but they go to pieces very often. It is the hardest service that we have on our road; I believe Mr. West has some swinging tender trucks on the milk cars. They ought to get some hard service.

Mr. West—We have had what is known as the pressed steel car truck for nine years running under our milk cars, and while the parties who controlled the milk interests claimed that the milk would go to New York in the shape of butter if we perpetuated that truck, the fact is that after the second year they had less sour milk than they ever had before. (Laughter.) That is not a joke, gentlemen. But if anyone has taken the pains to ride on a milk car with an elliptic spring, he will find that the milk is going in the cans with all the force that it is possible to exert, whereas with the other truck there is a little tremor. It is a fact that we have never had as little trouble with our milk (and we are the second largest milk carrier in the State) as since we had the truck with the coiled spring, and all our milk cars are fitted with that truck.

Rolling Stock Notes on the Erie.

Fifteen of the 25 Brooks consolidation locomotives having Wootten fire-boxes, 64-in. drivers and 17-ft. driving wheel base, previously referred to in this paper, have been delivered to the Erie. The locomotives are being placed on the heavy grade divisions, some of them working coal runs in the Erie's bituminous coal territory. Of the eight Baldwin compound passenger engines, Atlantic type, recently ordered, four have been delivered at Jersey City, where they were broken in before going into regular passenger service on the Ohio Division. Eighteen of these engines had previously been built at Baldwins for the Erie. The Susquehanna shops will presently build four engines of this type, the boilers for which have been ordered from Samuel Smith & Son, of Paterson, N. J., and the compounding features of which will be built by the Baldwin Locomotive Works. These four engines will run on through train working between Hornellsville and Buffalo. With



The Erie Railroad's "Atlantic" Locomotives.

the completion of the order for eight engines building at Baldwins the through train movement between Jersey City and Galion, Ohio, with the exception of the Delaware Division, Port Jervis to Susquehanna, will have been covered by this type of engine. The Delaware Division is a low grade division and through trains are there hauled by eight-wheel Baldwin compound engines. It is an interesting fact that regardless of all assertion that the wide fire-box engine has failed to satisfactorily burn bituminous coal, as bituminous coal goes, without special selection, both the passenger and consolidation freight engines here considered are burning it at all points west of Hornellsville, and it is said that low steam is unknown. East of Hornellsville, a mixture of 35 per cent. run of mine bituminous and 65 per cent. "bird's-eye" anthracite is used. This fuel also gives satisfaction and demonstrates that the engines have a sufficient steam reserve under heaviest duty.

From the Baldwin Locmotive Works' "Record of Recent Construction, No. 20," the accompanying diagram of the Erie's Atlantic type engine No. 512 is reproduced with some information as to the work done by these engines. The cylinder dimensions, 13 in. x 26 in. and 22 in. x 26 in., may be seen on the diagram, with weight distribution and main dimensions. From reports made in June and July it is found that on the New York Division these engines were hauling an approximate average of 675,000 lbs., exclusive of the weight of engine and tender, the running time over the division being 2 hours and 25 minutes for 87 miles. This is taken from the records of train No. 5. The average grade between Jersey City and Otisville, a distance of 75 miles, is 12 ft. per mile with short grades of 60 ft. per mile, the average speed, including all stops and slow-ups, being 37 miles an hour.

The Susquehanna Division is low grade, ranging from 1.6 ft. per mile between Hooper and west of Barton, 30¼ miles, down grade westward, to 9 ft. per mile for 1¾ miles up grade between points east and west of Binghamton. There are 18 miles from near Chemung to a point west of Horseheads, where the grade is 6.8 ft. per mile up grade, and also 45 miles from a point west of Big Flats to the end of the division where the up grade is 5.2 ft. per mile. These grades are here given that a general idea of the profile of the division may be had in reading the table showing speed and weight of trains on the Susquehanna Division.

Reports from the Allegheny Division show tnat the lightest trains hauled by these engines were four cars, 170 tons back of the tender; that the heaviest trains were of six cars, 255 tons back of the tender, and that the average speed was 40 miles an hour. The value of this work will be understood from the following tabulation of grades.

Hornellsville to Tip Top, 13 miles 32 feet per mile up.
Tip Top to east of Belvidere, 24 miles 17 feet per mile down.
East of Belvidere to Summit, 9 miles 42 feet per mile up.
Summit to West Salamanca, 37 miles 8.6 feet per mile down.
West Salamanca to Little Valley Summit, 9 miles 25 feet per mile up.
Little Valley Summit to east of Persia, 10 miles 32 feet per mile down.
East of Persia to west of Persia, 2 miles 30 feet per mile up.
West of Persia to Dunkirk, 23 miles 35 feet per mile down.

This road is now asking bids for 26 passenger coaches. They will be 60 ft. long over corner posts and will have Buhoup three-stem couplers, Standard steel platforms, inside hung brakes, interior finish of mahogany, and, possibly, copper-sheathed car bodies. In asking for bids the body finish in copper-sheath or varnish was left optional in the railroad's specifications. The final choice will turn on comparative cost of wood finish or copper sheathing. About 1,000 lbs. of copper are needed per coach. There are now four copper-sheathed coaches in service on the Erie, the oldest car having been out about three years and the others more than two years without being shopped for body work. With feeling therefore strong in their favor copper-sheathed cars are likely to become much better known when the first cost can be brought within acceptable limits. Dimensions of three 65-ft. baggage cars now being built at the Pullman Works appear in car building notes, in this issue.

SPEED AND WEIGHT OF TRAINS ON THE SUSQUEHANNA DIVISION, ERIE RAILROAD.

Train.	Miles.	Total Time.	Stops Time.	Running Time.	Cars.	Weight.
5	140	3h. 30m.	15	3h. 15m.	Postal	49,000
					Combination	46,400
					Coach	86,575
					Pullman	90,000
					"	90,000
					"	90,000
Average miles per hour			40			451,975
8	140	3h. 22m.	18	3h. 04m.	Coach	86,575
					Day coach	86,575
					Pullman	90,000
					"	90,000
					Café	110,000
					Pullman	90,000
Average miles per hour			42			553,150
7	140	3h. 20m.	12	3h. 08m.	Express	53,350
					Café	110,000
					Coach	86,575
					"	86,575
					Pullman	90,000
					"	90,000
					"	90,000
Average miles per hour			42			606,500

Train.	Miles.	Total Time.	Stops Time.	Running Time.	Cars.	Weight.
10	140	3h. 30m.	18	3h. 12m.	Baggage	49,300
					Café	110,000
					Coach	86,575
					"	86,575
					Pullman	90,000
					"	90,000
					"	90,000
Average miles per hour			40			602,450
1	140	3h. 04m.	18	2h. 46m.	Baggage	49,300
					Express	53,350
					Pullman	90,000
					Café	110,000
					Coach	86,575
					"	86,575
					"	86,575
Average miles per hour			45.7			562,375
2	140	3h. 03m.	21	2h. 42m.	Baggage	49,300
					Express	53,350
					Pullman	90,000
					Café	110,000
					Coach	86,575
					"	86,575
					"	86,575
Average miles per hour			45.7			562,375

The Eliminating of Grade Crossings and Double-Tracking on the Boston & Maine.

The construction of a second track upon that portion of the main line of the Eastern Division between Salisbury, Mass., and Greenland, N. H., had long been needed; but as this was a part of the property of the Eastern Railroad in New Hampshire, extending through that state from the state line of Massachusetts to the state line of Maine, operated under a lease, the terms of which imposed all expenditures of this nature upon the lessee and gave the results thereof to the lessor at the end of the lease without reimbursement to the lessee, the whole matter was postponed until necessary changes in the relations between the two companies could be brought about. By an act passed in the Legislature of Massachusetts, Maine and New Hampshire in 1898, the Boston & Maine was given authority to purchase and hold the shares of the capital stock of any railroad corporation whose road it leases and operates. Following this, the Eastern Railroad in New Hampshire passed out of existence as a separate company and became a part of the Boston & Maine Railroad, and the directors immediately authorized the construction of this second track, a distance of 12 miles, and the separation of all the public highway crossings thereon, 13 in number, at an estimated cost of $400,000. Surveys were made and plans and specifications prepared for masonry, bridges and grading by the road's Engineer department under the direction of the Chief Engineer during the latter part of the summer of 1899. The actual work was commenced about the middle of September and the new track for a distance of 11 miles was ready for traffic on the 25th day of June, when the present timetable went into effect.

The building of a second track requires that the roadbed be widened about 12 ft., that stations be moved, that freight houses be changed, that freight yards and side tracks be re-arranged, that bridges, under-passes and culverts be widened and in many cases rebuilt, and where grades were separated that bridges be constructed. In this case nine grade crossings have been abolished, seven by raising the streets; two by lowering them.

The plan in general was to contract and commence first the undergrade bridge and culvert masonry, then to contract the grading and ledge work at all points along the location where horses and carts could be used to good advantage and then for the railroad to do, itself, the excavating and filling, to sub-grade where the steam shovel and construction trains could be used best. Weather conditions were such that the steam shovel work was not suspended until Christmas, and was resumed again the latter part of April, from which time the whole work was pushed, Sundays as well as week days.

The period being short, the whole force was concentrated on the new track until the change of time and the crews were then transferred to the work on the old track which, for a distance of eight miles out of eleven, had to be raised from 1 ft. to between 2 and 3 ft., to conform to the new grade and alignment established for the double track roadbed. After this latter work had been accomplished, early in August, the crews were reduced, as the permanent surfacing, dressing off of roadbed and

ditching could be done slower as well, the idea being to have the whole work completed during the fall.

The new track is laid with 33-ft. rails, weighing 85 lbs. per yd., with the Weber joints and tie plates on every tie, and ballasted with gravel to a depth of 18 in.

American Practice in Block Signaling.*

By B. B. Adams.

IX.

AUTOMATIC BLOCK SIGNALS.

Automatic signals, actuated by the passage of the wheels of the cars and engines along the track, were tried in this country almost or quite as early as manual block signaling; and as the wages of competent men have been and are much higher in this country than in Europe the need of automatic apparatus was from the first felt more strongly here than in England. Consequently the automatic signals of the present day are the result of American development. In Europe they have not even been tried, except in a very few places. Thomas S. Hall, of Connecticut, began his experiments in 1866, and in 1871 had 16 miles of road signaled on the Eastern Railroad (now a part of the Boston & Maine). Rosseau's apparatus was in use at Philadelphia at the time of the Centennial Exhibition in 1876. These early inventors used track instruments or treadles which, pressed down by the wheels of a passing train, closed or opened the electric circuit in a wire carried on poles from one end of a block section to the other. Hall and his successors developed this method to a high degree of perfection, but wire-circuit signals have now been superseded practically everywhere by the rail-circuit, in which the rails of the track take the place of the wires; so that the oldest form of automatic signal which is still in use is the clock-work apparatus of the Union Switch & Signal Company. The first permanent installation of this was on the Fitchburg Railroad (now a part of the Boston & Maine), from Boston to Waltham, Mass., in 1879-80, though Frank L. Pope had made experiments on the Boston & Lowell eight years earlier, and at Philadelphia in 1876 had worked a signal through a track submerged in water.

THE UNION CLOCK WORK SIGNAL.

This signal is a disk, turned on a vertical spindle, by clock work moved by a weight. The arrangement of the signals and their relation to the track is shown in Fig. 26, in which the parallel lines represent the track. H. and Hc represent the signals. The block section extends from B to C. The rail circuit battery for this section is at b^1. When there is no train in the section this holds relay *r* closed, which, in turn, closes the circuit through the signal magnet *s*, which holds the signal in the all-clear position. The presence of a train in the section, or any metallic connection between the left hand rail of the track and the right hand, makes a shorter path for the current and withdraws practically all of it from relay *r*, allowing its armature to drop, demagnetizing *s* and thus turning the signal to the stop position. The rail circuit, connected by wires, is carried through the rails of the side track at *v* for a short distance, so that a train entering the side track is protected, the same as when on the main track, until all of its cars are fully clear of the main line. The switch, or any number of switches in a block section, must be connected with the signal so that when set for the side track the signal will indicate "stop" to approaching trains. The rail circuit may be carried through a spring connection contained in a box at the switch, so that when the switch rails are moved the circuit will be broken on one side, and the signal turned to "stop." This arrangement is shown (enlarged at *vc*) in Fig. 26. Another method is to run the circuit from the local battery *L* direct to the switch, as shown in Fig. 27. With this arrangement the signal is controlled by the switch, even if the track circuit should be deranged; but if the switch is a considerable distance from the signal and the wires are run on poles there is increased liability to disturbance by lightning.

On some roads the signal, *H*, is set about 150 ft. within the block section, say opposite *c*, Fig. 26, so that the engineman as he enters the section at *a* can see the signal turn from all-clear to "stop" and thus be assured that it is in working order and that his own train is protected. The battery, *b*, in Fig. 26, furnishes the current for the section A B. A battery for a track circuit must be of low intensity on account of the poor insulation of the rails from the ground. It usually consists of two jars of the gravity type, kept in a well far enough below the surface of the ground to be free from the effects of frost.

At each rail joint the two adjoining rail ends are connected by a bond wire to insure a good electrical connection, and at the ends of the sections as at *a* insulating material is put inside the splice bars and between the rails and around the bolts.

The appearance of the signal is shown in Fig. 25. The clock work is contained in the box immediately beneath the disk or target, and it is worked by a weight which hangs within the hollow iron post, 16 ft. high, which supports the signal. The target is fixed to the vertical axis supporting it, and when it is set so that its face is visible to the engineman it indicates "stop." For the all-clear indication it stands with its edge toward the train, or, as is the case on some roads, another target of a different shape, fixed at right angles to this, indicates all-clear. The stop target is usually painted red and the all-clear target, when used, is painted white. Where a signal of this kind is used as a permissive signal, green is used in some cases instead of red. The lamp fixed to the top of the spindle has, in two of its sides, opposite to one another, red lenses; and in the other two sides white or green lenses, according to which of these colors is used to give the all-clear indication.

Fig. 25.

The vertical axis of the signal is connected by miter gears with a horizontal shaft having a ratchet wheel and a winding drum which are turned by the weight, as just explained. The horizontal shaft carries on one end a cross-head which has in its arms 4 pins so placed as to engage with a detent on the end of a horizontal bar pivoted near its middle, and having a slight motion up and down, at right angles to the axis of the winding drum. The horizontal bar is attached at its rear end to the armature of an electro-magnet and can engage one or another of the pins on the cross-head, according as it is in one or the other of its positions. The place of the pins is so chosen with reference to the detent on the horizontal bar, that when the armature at its rear end is attracted, and the bar is at its highest point, the disk will be held in the position indicating "all-clear," but if the current ceases in the electro-magnet, its armature falls away and the detent releases the clock work, which then turns one-quarter of a revolution, carrying the signal to the "stop" position. It is arrested by the detent engaging with the next pin on the cross-head. When the electro-magnet is again energized the clock work makes another quarter revolution and brings the signal again to "all-clear." The current through the electro-magnet in the signal is controlled by the track circuit relay, as shown in the diagram, and this last is open or closed according as the block is occupied or unoccupied by a train. A broken rail, by interrupting the current through the relay acts on the signal the same as a train.

Since the movement of the signal is dependent upon the clock work this must be wound at frequent intervals. That this may not be neglected and by chance leave the signal standing all-clear when it is run down, the current which operates the signal is made to pass through a pair of springs which are held together when the signal is wound up, but which are separated when the weight has nearly reached the bottom; so that just before the clock work is run completely down the circuit through the signal is opened and the signal left standing at "stop." Track circuit batteries must ordinarily be renewed about once in two months; the signal batteries will run longer.

In consequence of the imperfect insulation, rail circuits do not work well for a length of track greater than about one mile, and the most common length is shorter than this. Where it is deemed unnecessary to have the block sections so short as this a number of successive rail-circuit sections are connected one to another, so that the signals may be placed two or three miles apart. When this is done the circuit of one track section is opened and closed by a relay worked by the adjoining section. For example, if the point B, Fig. 26, were an intermediate point in a block section, the circuit made by battery *b* would be arranged to open and close by the action of relay *r*. This can be repeated as many times as may be found necessary.

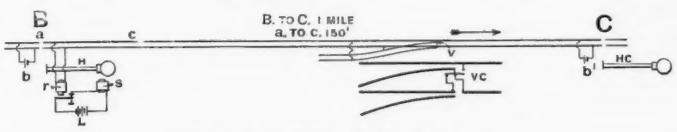


Fig. 26.—Rail Circuit Block Signal.

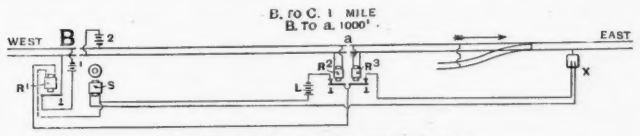


Fig. 27.—Rail Circuit With Overlap.

The Overlap.—The arrangement of distant signals in automatic systems, and the use of automatic signals on single track, will be taken up in a later chapter. Most of the early automatic block signals had no distants, and to avoid the necessity of requiring trains to slacken speed at the signals (as in case of fog) the "overlap" is used. The arrangement of overlap circuits is shown in Fig. 27. The block section *B C* is of the usual length, as in Fig. 26, but the rail circuit is divided into two parts, one from *B* to *a* and the other from *a* to the outgoing end. The signal magnet, *s*, is controlled by the relays (R^2 and R^3) of both these track sections, and of course will thus stand in the stop position as long as a train is on the rails of either section; and in addition to this the relay, R^3, of the overlap section, controls relay R^1, so that until a train passes *a* the signal at *A* (the beginning of section *A B*, the next section to the west) remains in the stop position, thus keeping trains from approaching *B* until the preceding train has passed beyond *a*. The switchbox *x* contains a circuit breaker, controlled by the switch rails, so that whenever these are set for the side track the signal at *B* will indicate stop.

*Previous articles of this series may be found on pages 4, 84, 83, 121, 161, 222, 565, 734.

International Association for Testing Materials.

We have lately published a pretty full report of the meeting of the American Section of this organization (pp. 715 and 739), and in the first part of that report we gave a very short synopsis of the address of Prof. Merriman, the retiring Chairman. As that address presented some weighty reasons for the reorganization of the Association we print now fuller extracts from it. The work laid out for the Association, and particularly developed by the American Section is of great importance to workers in steel—designers, engineers and manufacturers—and they should make themselves familiar with it and consider how they may help it along with money (of which but little is needed) and with influence and cooperation. Prof. Merriman's remarks will give them an idea of how matters stand. If they wish more information they can get it by addressing the Chairman of the American Section, Prof. H. M. Howe, Columbia University, New York, or the Secretary, Prof. J. M. Porter, Lafayette College, Easton, Pennsylvania.

. . . To-day I shall merely state a few facts regarding the progress of our work during the past year, and briefly indicate a method by which, in my opinion, the effectiveness of our organization may be promoted and its important technical work be carried on more successfully than before.

The Council of the Association at a meeting held in September of last year formally abandoned the plan of holding its Congress at Paris in 1900, and recommended that all members support the Congress on the Testing of Materials which had been called by the authorities of the Paris Exposition. That Congress was held in July with successful results; of the forty papers announced to be read it is gratifying to note that six were by members of this American Section, a greater number than from any other country with the exception of France. While this Congress took no action on the subject of the unification of tests it is believed that its discussions have materially assisted in this direction.

. . . The policy of the International Association in regard to publications is not satisfactory to many American members. The proceedings of the Council meetings are not published, no financial statements are given out, and practically nothing is known about the work of the technical committees. This is the more remarkable because the journal *Baumaterialenkunde* has been designated as the official organ of the Association and receives compensation therefor. Yet in the 24 numbers of that journal from July 1, 1899, to July 1, 1900, there are only eight pages of the total 412 pages which contain official matter of the Association.

Besides the eight pages in *Baumaterialenkunde* there have been issued by the Association during the past year two circulars relating to the Paris Congress, and a pamphlet containing an international list of members and technical committees. This list was closed on June 30, but the copies forwarded to this country did not reach us until January, by which time our membership had increased so that the number of copies was not sufficient to supply all the American members. . . . Attention may also properly be called to the fact that no statements regarding the expenditures of the Association have ever been made as far as I am able to learn. . . . After the experience of over two years in conducting business with the International authorities I have been forced to the conclusion that a reorganization is necessary in order to enable it to effectively conduct its affairs and successfully carry on its scientific work.

The reform that I would advocate is one suggested by the experience of the American Section which now issues Bulletins giving the reports of Committees, the proceedings of meetings and regular quarterly statements of receipts and expenditures. Let the members of the Association in each county form a National Section which shall conduct its own affairs, levy its own taxes, elect its own Representative on the International Council, and publish its own proceedings. Let the members of technical committees in each county report to meetings of their National Section where these reports may be discussed so that they shall finally have a true national character. Let the various national Sections interchange their publications and each criticise the technical views of the others. At stated times let international Congresses be convened to discuss and unify the views of the National Sections, and it is plain that the work of such congresses can be more quickly done and will have greater authority than under the present system where each national branch of a committee has little or no knowledge of the views of members in other countries. . . .

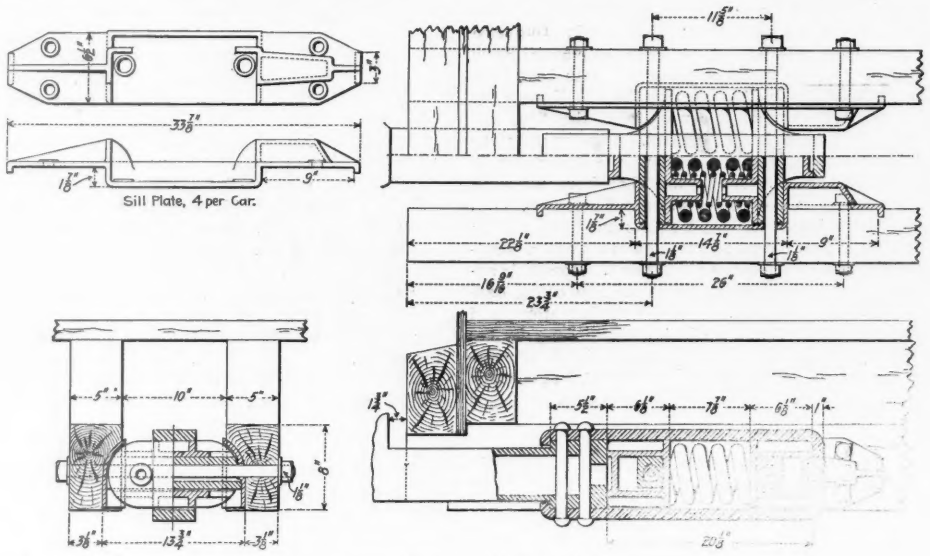
Regarding the work of this American Section I need

say but little, as the reports of our officers will give detailed information. The report of the Secretary will show that the increase in our membership has been steady and gratifying. The report of the Treasurer will show that subscriptions aggregating $705 have been made to the Publication and Research Fund which was inaugurated at our last meeting. The statement of the Publication Committee will show that 17 Bulletins containing our proceedings and the reports of two of our technical committees have been issued. Eleven of these are devoted to the specifications recommended by the American branch of Committee No. 1, and at its request were issued in editions of large size. The inset sheets of these Bulletins have proved a heavy expense in spite of the fact that a large share of the cost was kindly borne by the *Railroad Gazette*, and it is a matter of regret that no balance now remains in the Publication Fund. I doubt not, however, that at this meeting, as at the one in Pittsburgh, members will feel the imperative necessity of the publication of our proceedings and come forward with generous subscriptions to that Fund. . . .

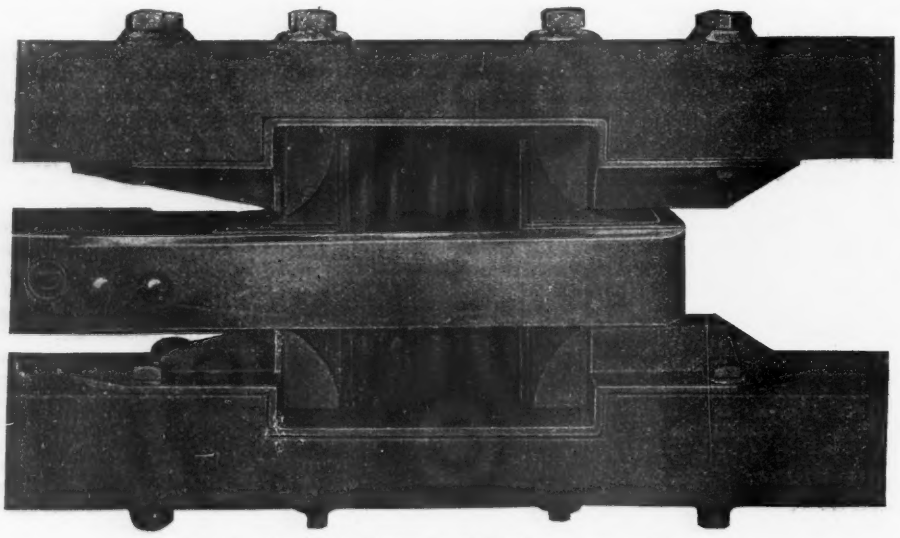
In conclusion let me express the opinion that the work of our International Association, important in the past, is to be still more important in future years. Its scientific investigations are now but barely begun, and its technical problems are but slightly advanced toward solution. This American Section, which includes all the members of the Association resident in the United States, is ready and anxious to cooperate with the members in other countries and with the international officers in advancing their scientific and industrial labors. I sincerely trust that all the deliberations of this meeting may tend to promote harmonious cooperation, effective work, and results that shall be valuable to all branches of the engineering profession.

The Dayton Twin-Spring Draft Rigging.

The Dayton draft rigging is made for both steel and wooden cars and in adapting it to the wooden car it is fitted for both malleable iron and wood draft sills. The illustration shows the latest form of the rigging as applied to wood draft sills. The rigging consists essentially of sill plates, stop bars and followers. The sill plates are gained into the draft timbers 1⅞ in. deep and are bolted to them with four bolts in each plate. The end of each sill plate has a lip gained into the draft sill, thus giving four points on the sill at which strains are received. As the sill plate is nearly 34 in. long the strains are distributed over a large area and are not concentrated at any one point; and furthermore the element of frictional resistance between the plates and the sills is important.



The Dayton Twin-Spring Draft Rigging.



The Dayton Twin-Spring Draft Rigging—Inverted Plan.

The stop bars are rectangular and are cast with an opening through the center. They remain in a stationary position and are rigidly secured to the sill plates and draft timbers by a 1⅛-in. bolt which extends through each stop bar, sill plate, and draft sill. The only duty these bolts have is that of binding the draft sills together and carrying the weight of the tail end of the coupler, the tail strap and springs.

Each follower has a rectangular horizontal opening through which the stop bars are passed. In a perpendicular direction the opening is made with sufficient clearance to allow the followers free movement, while in a horizontal direction it is made 2⅛ in. greater than the width of the stop bar. Each spring is supported at its ends by a boss cast on each follower. The length of these bosses is such that while the springs are without load the distance between the bosses is 1⅞ in. A travel of 2 in. is required to close the springs and therefore the bosses come in contact before the spring is fully closed.

Under buffing strains the rear stop bar receives the load and the forward follower travels loosely over its stop bar and compresses the springs. The forward stop bar receives all pulling strains and it may be noted that the sill plates are both heavily ribbed for withstanding strains in the direction in which they are applied. These ribs extend inwardly to a point beyond the center of each spring and therefore the strains applied to the stop bars and followers are crushing strains. The ribs on the rear end of each sill plate form a box which gives great strength and at the same time gives a guide to prevent the tail strap having too much side play.

In working out this design three objects have been sought, namely, to eliminate bending and shearing strains; to keep the number of parts at the minimum; and to bind the draft sills together. These objects seem to have been attained. The bending and shearing strains which are so destructive have been reduced to direct crushing strains. The rigging complete per car, as furnished by the makers, consists of four sill plates, four stop bars, and four followers. This leaves the railroad to furnish only two tail straps, four springs, and 20 bolts per car. It will be noted that the bolts which pass through the stop bars bind the draft sills rigidly against spreading. This is essential to the success of draft rigging. Most of the failures are caused by the draft timbers being forced apart and split or broken, owing to the side and twisting strains, which they are not designed to meet.

Claims made for the rigging are that it can be easily and quickly inspected, all parts being in plain view; that it can be quickly put up and taken down and also that it can be applied to a car at a lower cost than any other good double spring rigging on the market. The rigging is fully covered by patents and is owned and for sale only by the Dayton Malleable Iron Co., Dayton, Ohio.

Notes on Maintenance of Way Engineering.

Profiles and Maps.

One of the troublesome things about an office is the profile; it is usually made up starting at the beginning and measuring continuously over the division. Whenever any change of line is made there is a break in the stationing, and as the mile posts are usually changed before a new profile is made, there is a chance for confusion. It is sometimes made up starting anew at each mile post, but this makes continual breaks in the profile and makes it more difficult to study a grade, as it often happens that any change made will run beyond a break. The writer can only suggest a new profile after each change of line of such moment as to affect stationing. One thing he would especially mention is the desirability of showing on the profile the plus to each head block or frog point, to each end of each bridge, and to the actual location of each mile post. He once worked on a road where mile posts had been placed on every, say, twentieth telegraph pole, the roadmaster believing that to constitute a mile. The profile in the engineer's office showed mile posts every multiple of 5,280 feet. He made a survey for a damage suit, tied it to a mile post, made his map showing the stream at Sta. 10,472; when checking up by the profile he was astonished to find Sta. 10,472 was in a cut with the ground each side much higher than the track, and that the offending stream was at Sta. 10,479. Of course, his work was wrong, until his superior visited the location and found it to be correct. The notes in the office, but not the profile, ought also to show the plus to each end of each building on the right of way, and the distance from the center of the main track to the near side of the building. It is well to have your record contain a diagram showing distances at right angles to the center-line and also the diagonal distance from each plus to the building opposite the other plus. This will give you a positive and permanent record, and avoids errors of misreading a figure that has become dim.

It is always advisable to use good books in taking notes and to make liberal use of sketches to explain the notes. The writer has found his prevailing tendency was to make the notes too brief and incomplete. There is little danger of taking too many notes. Before you leave ask yourself if your notes show where the location is, what the conditions are, why the trouble occurred or why the thing existed, and always when it occurred and when the survey was made. Go over in your mind the conditions as they are, the claims you hear and take every measurement needed to verify or disprove any and every claim made. Where it is simply notes of station grounds, be sure and get full notes to cover any question to come up in the future as to change of tracks, extension of sidings and every other question likely to arise. Make your notes complete. It takes more time now but it will save many a tiresome trip back at busy times in the future.

It would be an excellent plan for an engineer to get notes and make an accurate topographical map of each station ground and the adjacent streets of the town at each of their stations. Most small towns grade their streets by the road supervisor's eye and local jealousies have much to do with drainage. Afterward when some one is flooded, the railroad is blamed, and having no evidence to contradict the local claimants, pays the damage and digs the required ditches, and growls at the injustice of it. An accurate topographical survey made by stadia or even by hand level checked up with engineer's level on ruling point in early days of town's existence would have saved all of it.

But to return to the profile: Besides notes mentioned it should have all streets and road crossings shown on it. It should always be kept up to date and where changes are taking place affecting any of these notes make a plain note with a soft pencil at each end of affected portion stating what it is and make correction as soon as is possible.

Each office should possess a map of its division on a scale large enough to show all divisions of land, either in country or city, and should show distance and angle from center line to section and quarter corners and in towns to the monuments at street intersections. Where the original monuments are lost and no new ones have been legally established, great care should be taken to ascertain where the original monument was. It is too long a question to discuss here, but every engineer should own Hodgman's admirable work on land surveys and become familiar with its teachings, which bear on these points. There are always two questions to the company's real property—its title and its location. You must have your lines to your property determined or you may some day lose it. The question of accuracy of measurement is of much less moment than that the starting point you measure from is correct. The determining of this is a judicial act, and sometimes one calling for sound judgment and common sense.

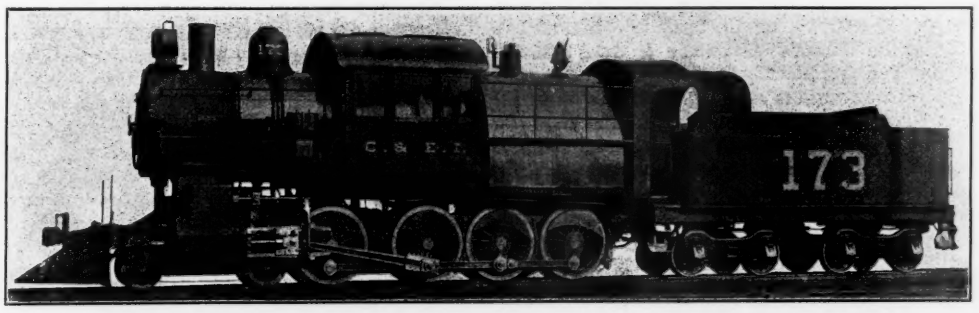
These articles are merely "notes" written in hope they may be useful to my fellows. My work has never been east of Indiana and it is not my aim to teach how the Pennsylvania or New York Central roads should be handled, but to assist those of my fellows who are called

on to improve our great stretches of western and southern roads where there is much to do and but little available to do with.

Birmingham, Ala. TRANSIT.

Wide Fire-box Freight Locomotives for the Chicago & Eastern Illinois.

The Pittsburgh Locomotive Works has just completed some wide fire-box, compound, 12-wheel freight locomotives for the Chicago & Eastern Illinois, which will burn bituminous run of mine coal. These engines are heavier than the new wide fire-box 12-wheelers of the Buffalo,



Twelve-Wheel Freight Locomotive with Wide Fire-Box—Chicago & Eastern Illinois Railroad.

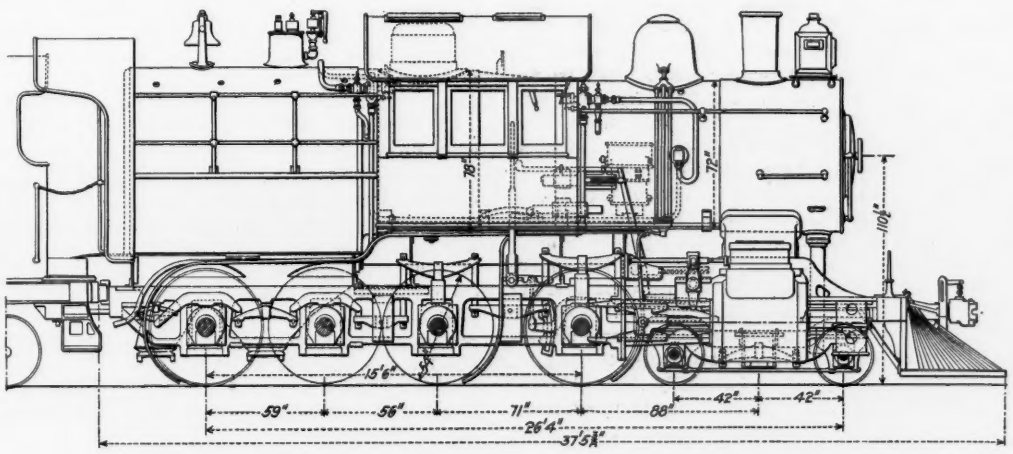
Rochester & Pittsburgh, illustrated in our issue of Oct. 12, have considerably wider grates and consequently the cabs of the Chicago & Eastern Illinois engines are placed ahead of the fire-box. In appearance and general proportions they resemble anthracite coal burning engines; the grate area is 72 sq. ft. This is more area than in any of the moderately wide fire-box engines recently built for bituminous coal; such as the Chicago, Burlington & Quincy "Prairie" type, the Chicago & Northwestern class "D," and the 12-wheelers of the Buffalo, Rochester & Pittsburgh. On the other hand, these are of about the same size as the fire-boxes of the new Baltimore & Ohio consolidation locomotives shown in our issue of June 15. The Baltimore & Ohio wide fire-box engines, we learn indirectly, are giving very good service.

The weight of the Chicago & Eastern Illinois engines on drivers is 150,000 lbs., and the total weight of the engine in working order is 189,700; the tender loaded weighs 98,000 lbs., and has a capacity of 4,500 gals. of water,

Height, center of boiler above rails	9 ft. 2½ in.
" of stack above rails	15 ft.
Drivers, material of main centers	Cast steel
" " " other centers	Steeled cast iron
Truck wheels, diameter	28 in.
Journals, driving axle, size	8½ x 10 in.
" truck " "	5½ x 10 in.
Piston rods, diameter	4 in.
Kind of piston rod packing	Metallic
Steam ports, length	H.P. 18 in., L.P. 21 in.
" " width	H.P. 1⅜ in., L.P. 2 in.
Exhaust " length	H.P. 18 in., L.P. 21 in.
" " width	H.P. 3 in., L.P. 3½ in.
Bridge, width	1⅜ in.
Valves, kind of	Balance slide valves
" greatest travel	H.P. 5 in., L.P. 6 in.
" outside lap	1 in.
" lead in full gear	1-16 in.
Boiler, type of	Wootten extended wagon top
" material in barrel	Steel
" thickness of material in barrel	11-16 and ¾ in.
Seams, kind of horizontal	Sextuple riveted
" " circumferential	Lapped and double riveted
Thickness of tube sheets	½ in.
" crown	7-16 in.
Crown sheet stayed with radial stays	
Dome, diameter	32 in.
Fire-box, material	Steel
" water space	Front, 4 in.; back, 3½ in. and sides, 3 in.
Grates, kind of	Cast iron, rocking pattern
Tubes, number	300
" material	Charcoal iron
" outside diameter	2 in.
" length over sheets	14 ft. 6 in.
Smoke-box, diameter	73 in.
" length	60 in.
Exhaust nozzle	Single
" "	Permanent
" " diameter	4½, 4¾ and 5 in.
" " distance of tip above center of boiler	9 in.
Stack	Straight
" inside diameter	16¾ in.
" height above smoke-box	2 ft. 9 in.

Tender.

Type	Swivel truck
Kind of material in tank	Steel
Thickness of sheets	5-16 and ¼ in.



Twelve-Wheel Freight Locomotive With Wide Fire-Box—Chicago & Eastern Illinois Railroad.

BUILT BY THE *Pittsburgh Locomotive Works*, PITTSBURGH, PA.

and 10 tons of coal. The cylinders are 21½ and 33 in. x 30 in., the drivers are 54 in. in diam., and the working steam pressure is 200 lbs. There are 181.4 sq. ft. of fire-box heating surface, 2,265.6 sq. ft. of heating surface in the tubes, or a total heating surface of 2,447 sq. ft. The boiler is 72 in. in diam. at the front and the center of the barrel is 9 ft. 2½ in. above the rail. The fire-box is 9 ft. long x 8 ft. wide and has a depth at the front of 71⅝ in. and 59⅝ in. at the back. The grates are level in both directions and are formed of six longitudinal sections, each of which sections can be rocked independent of the others.

While the design of the fire-box is the most important feature, there are several interesting details. The frames are cast steel and the frames and cylinder connections are along the same general lines as those used for the big Pittsburgh, Bessemer & Lake Erie engines and illustrated in detail, Aug. 24. In addition to the ample cross-braces at the front, there is a well designed cross-brace at the front of the fire-box to which it is connected. The valve rod extends back and the rear end has a bearing in the guide yoke, the rocker being connected near the forward end of the rod. The brakes are hung at the back of the driving wheels, a short front end is used and the cab is of metal.

The following are additional dimensions:

Wheel base, total, of engine	26 ft. 4 in.
" " driving	15 ft. 6 in.
" " total, engine and tender	51 ft. 2 in.
Type of under frame	Steel channel
" truck	Fox pressed steel
Truck with rigid bolster	
Type of truck spring	Elliptic
Diameter of truck wheels	33 in.
" and length of axle journals	5 x 9 in. (M. C. B.)
Type of drawhead	Automatic coupler

Fast Running on the Northern France.

BY J. P. P.

Ten years ago no one would have thought of comparing French express train speeds with English. There were, then, it is true, many creditable bursts of speed, but the two countries were clearly not in the same class and few expected that France would ever draw level with England in this form of commercial enterprise. If any apprehension existed in England as to its crack trains being beaten, it was thought that the United States alone was likely to prove a formidable competitor in the future. Events have, however, falsified expectations as usual, and to-day, while England still holds first place for the frequency of its express services, and the general high average speed of its fast trains, it has had of late to yield the palm to both the United States and France for the very highest instances of express speed in everyday working, and, so far as indications can be trusted, it is likely before long to drop still further behind in this direction.

The rise of France in express speed has been so rapid and brilliant that an instance from everyday working may prove of interest. The train selected (7:48 a. m.) was the fastest between Arras and Paris and forms part of the through service between Lille and the latter town. The distance from Arras to the French metropolis is 119 miles and, as the gross time allowed is only 2 hours 12 minutes (or 2 hours 8 minutes after deducting the 4 minutes allowed for the stop at Longueau) it will be seen that the scheduled timing is very fast. A down train covers the distance in 2 hours 10 minutes, but, having no intermediate stop, is not quite so good as the train we have under notice. The train engine was No. 2,180, one of the last batch of express engines built for the Northern Railroad. Driving wheels (four) are 6 ft. 11⅞ in. in diam.; cylinders, 13⅜ (h.p.) and 20⅞ (l.p.) x 25⅛ in.; heating surface, 1,862¼ sq. ft.; grate area, 28 sq. ft.; pressure, 213 lbs.; and weight, in working order, 51.57 tons. The train load was five of the new bogie corridor coaches (32½ long tons each) recently put in service on the through trains of the Nord, and three vans about 10 tons each in weight (in all about 191 tons). With these preliminary remarks we will now give the log of the train as taken personally by the writer:

Arras to Paris, 119 Miles in 124 3-4 Minutes (net); 57 Miles an Hour—Engine 2,180—Load: 5 Corridor Vehicles, 3 Vans 191 (Long) Tons.

Kilometers.	Stations.		Time, Actual. H. M. S.
	Arras	Depart.	7:49:32
8.6	Boisieux	"	7:57:38
17.6	Achiet	"	8:03:42
23.1	Miraumont	"	8:06:52
28.1	Beaucourt-Hamel	"	8:09:37
36.3	Albert	"	8:14:18
42.7	Buire sur l'Ancre	"	8:18:02
44.8	Méricourt-Ribémont	"	8:19:11
47.5	Heilly	"	8:20:48
52.2	Corbie	"	8:23:35
55.5	Daours	"	8:25:30
65.6	Longueau	Arrive.	8:32:08
	Longueau	Depart.	8:37:50
4.0	Boves	"	8:42:09
9.5	Dommartin-Remiencourt	"	8:46:00
14.9	Ailly-sur-Noye	"	8:49:44
21.8	La Faloise	"	8:54:31
31.1	Breteuil	"	9:00:28
33.4	Chepoix	"	9:01:58
38.7	Gannes	"	9:05:06
46.5	St. Just	"	9:09:32
60.9	Clermont	"	9:17:26
68.3	Liancourt-Rantigny	"	9:21:43
71.8	Laigneville	"	9:23:47
75.7	Creil	"	9:26:30
85.1	Chantilly	"	9:33:30
91.0	Orry-la-Ville	"	9:37:30
96.3	Survilliers	"	9:41:14
102.4	Louvres	"	9:45:03
106.5	Goussainville	"	9:47:16
111.2	Villiers-le-Bel	"	9:49:53
115.9	Pierrefitte-Stains	"	9:52:26
119.9	St. Denis	"	9:54:38
126.0	Paris (Gare du Nord)	Arrive.	9:59:57

The train was slightly checked just outside Arras, and ran very slowly through Creil station and yard. This works out in English units 119 miles at 57 miles an hour, deducting the stop at Longueau, the speed being sustained with remarkable uniformity. The highest speed touched seems to have been 68 miles an hour.

The Kansas City-Leavenworth Electric Railroad.

The Kansas City-Leavenworth Electric Railroad is one of many short lines that have become close competitors of interurban steam roads. This railroad has 23 miles of single track, with various turnouts and Y's, six coaches with smoking compartments, four combination passenger and baggage coaches, three excursion cars, 15 flat cars, one box car, one steam locomotive and one motor-driven construction car. The railroad company's charter was issued in April, 1899, and the road was opened to the public January, 1900. Starting at Grand View, a suburb of Kansas City, Kan., near the terminal of the Metropolitan Street Railway Company's Grand View branch, it parallels the Kansas City Northwestern Railroad eight miles to Vance, and runs from Vance to Wolcott, where the general offices, power station and barns are located. Beyond Wolcott the road parallels the main line of the Missouri Pacific almost to Leavenworth and at the latter point connection is made with the Leavenworth Electric Railroad, which has a three-mile line to Fort Leavenworth.

The power plant consists of a 1,000-h.p. simple non-condensing Hamilton-Corliss engine, cylinders 32 x 54 in.; two 300-k.w. General Electric belted generators mounted on a shaft with friction clutches, so that either or both can be put in action by the Corliss engine; four Sterling water tube boilers of 250-h.p. each, carrying 120 lbs. working steam pressure, and an Ingersoll-Sergeant air compressor driven by a 10-h.p. vertical engine. Air for the brakes is stored in a yard tank under 300 lbs. pressure and is charged into the cars to about 200 lbs. A small dynamo, to light the offices and power houses, is also driven by the 10-h.p. vertical engine when the main plant is shut down.

The passenger coaches are 31 ft. 8 in. over corner posts, 8 ft. 5 in. wide over sill plates and 41 ft. long over bumpers, weighing about 42,000 lbs. They were built by the American Car Co., of St. Louis, and have vestibules at both ends; Hale & Kilburn seats; Consolidated electric heaters; Wilson trolley catcher and Magann air-brakes and whistles. There are on each car four 50-h.p. Lorain "Steel" motors, geared to 45 miles an hour. The trucks are double Peckham 14-A, with 33-in. wheels, 4¼ in. tread. There is also a single equipment of Lorain double trucks, type F. The wheels are furnished by the Kansas City Car & Foundry Works, now owned by the Griffin Wheel Co., of Chicago.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

ADVERTISEMENTS—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

The total shipments of freight over all railroads of the German Empire increased from 222 millions of tons in 1896 to 273 millions in 1899, which would be a creditable growth in a much younger country than Germany. The shipments of freight passing the border (export, import and transient), increased from 34½ to 41¾ millions in the same time, so that six-sevenths of the whole increase was in domestic traffic. This, however, does not take account of imports and exports by sea. The exports by rail have uniformly exceeded in weight the imports by rail. The shipments of coal alone (including lignite) increased from 98 millions to 117 millions of tons (of 2,000 lbs.), and in 1899 coal made 42½ per cent. of the entire freight; iron ore, pig iron and brick, 16 per cent. Of all farm products sugar beets make by far the greatest bulk—more than wheat, rye and barley together; but they are usually carried only short distances to the sugar mills. Next to this in bulk is manure and other fertilizers.

The Chesapeake & Ohio Railway, the Norfolk & Western and the Southern have recently entered into joint arrangements with the United States Shipping Company whereby ocean service is to be furnished to the following European ports: Rotterdam, Antwerp, Glasgow, Belfast and Dublin. Sailings will be made direct from Newport News to these ports, and in the case of Rotterdam there will be direct sailings also from Norfolk. Furthermore, arrangements have been made with R. L. Sloman for service to Hamburg to which port there will be sailings from both Newport News and Norfolk. By connections with still other steamship companies these three railroads will get direct service from Norfolk and Newport News to London and Liverpool. Six regular ships will be employed in this service, four sailing from Norfolk and two from Newport News. When steamers sail from one of these ports the railroad line terminating at the other will barge its freight alongside the steamer. This seems to us a very important step, not merely for the local ports concerned but for the foreign trade of the United States in general. While not entirely new in detail, it is new as a working combination, big enough to make sure of cargoes for outbound ships. It is not reasonable to suppose that the commerce which goes that way will be wholly or even largely taken from other American ports, but that new trade will be created. For instance, it is probably true that the Chesapeake & Ohio could to-day supply the coal for the Egyptian State Railroads if the company would agree to deliver that coal in Alexandria.

Gross earnings of railroads for October, unlike those of September, again show gains. *The Chronicle* presents reports from 98 roads comprising 92,527 miles this year against 89,661 miles for the same roads a year ago. The gross earnings for October, 1900, were $58,608,765 against $55,801,490 in 1899, which is a gain of $2,807,275, or 5.03 per cent. These follow very substantial gains of previous years, which were $6,094,486, or 10.91 per cent. in 1899; $2,628,584, or 4.91 per cent. in 1898, and $4,602,179, or 8.97 per cent. for October, 1897. The gain this year came in the face of heavy falling off in the movement of wheat due to the failure of the spring wheat crop in the Northwest, but was helped by increased movements of cotton and live stock. There were 80 roads of the 98 reporting that showed increases, and 29 of these in excess of $30,000. The Chesapeake & Ohio leads with $247,728. Then follow the Missouri, Kansas & Texas $242,571, the Southern Ry. $236,792, the Missouri Pacific $229,651, the St. Louis & San Francisco $221,578, the Choctaw, Oklahoma & Gulf $215,104, and the Texas & Pacific $205,671. Only five companies report decreases of over $30,000. Of these the Great Northern and the Canadian Pacific show far the greatest decline, namely $393,229 and $319,605 respectively. All these five roads run through the spring wheat territory. Receipts of grain for the five weeks ended November 3, comprising wheat, corn, oats, rye and barley, at ten Western points were not quite 86 million bushels against nearly 91¾ million bushels for the corresponding weeks a year ago. At Duluth particularly wheat receipts fell from 9,700,000 bushels in 1899 to 2,570,000 this year. Receipts of the five cereals at Chicago for the even month were 30,840,000 bushels against 34,760,000 last year, and 34,300,000 in 1898. Deliveries of live stock at that point, however, aggregated 26,196 carloads against 23,156 a year ago. At the Southern outports cotton arrivals for October aggregated 1,473,202 bales against 1,110,043 bales in 1899, and 1,692,822 bales in October, 1898. Galveston alone made a lower record. Overland shipments were 255,659 bales this year against 266,742 bales in 1899. All the groups of roads show increases except the Northwestern and North Pacific group in the spring wheat district. Their receipts have fallen from 17¾ million dollars in 1899 to 16 2-3 million dollars in October, 1900.

Draft Gear and Couplers for Heavy Service.

In a letter which appears on another page of this issue, Mr. George Westinghouse makes an interesting and important suggestion, namely, that the higher officers of the railroads get together and use their authority and influence to bring about through their technical staff the immediate selection of some form of draft gear and car coupler which shall be the standard for all new cars. The need for some such action is obvious; that we shall take up a little later. The practicability of it may at first thought seem dubious; that we shall consider now.

There are in actual use on the freight cars of the United States something more than 100 different couplers. If the difficulty of getting people to unite for common action increases directly as the square of the number of the people concerned (this does not seem to be an unreasonable assumption) it would be 2,500 times as hard to get these 100 different makers to agree as it would be to get two makers to agree or, in other words, impossible; but really the problem is very much simpler. According to the latest statistics of the Interstate Commerce Commission there are only ten different makes which are used each on 20,000 or more cars. There are only six, each of which is used on 50,000 cars or more. There are only two, each of which is used on more than 100,000 cars. The immense majority of the couplers listed are used on a very small number of cars, and indeed there are only 16 different makes that are applied to 10,000 or more. We may assume at the outset that it is not worth while to consider any coupler that is not now applied to more than 10,000 cars, and then we have but 16 concerns to reconcile, and the difficulty diminishes handsomely; 40 times if we still keep up the assumption that it is as the square of the number concerned. Indeed half a dozen men among the coupler makers would probably control the situation.

The proposition is to exchange licenses to use the controlling patents under some arrangement which would give each coupler maker a fair share of the business. To-day the coupler business is a matter of profits on manufacture rather than of royalties on patents, and no doubt the actual manufacture of one selected coupler would distribute itself automatically among those concerns which are now making the 100 different kinds, to their advantage as well as to the advantage of the railroads. The selection of a composite coupler which should combine the best features of all would be a comparatively simple matter, once the commercial questions are settled.

In the case of the draft gear the situation is quite different. The number of meritorious designs to choose from is far less than the number of couplers, but there are two fundamental types radically different, and the controlling difficulty of agreeing on a standard is now mechanical rather than commercial; that is, the railroad officers who select a standard draft gear must decide immediately between a friction gear and a spring gear. Our readers need not be told again that we look upon a friction draft gear as the inevitable final form and regard a spring gear as only a passing expedient. We need not go again over ground which we have traversed so frequently. We say this with due consideration of the various good draft riggings depending entirely upon springs, an excellent example of which appears in this issue.

We know very well that a number of mechanical officers do not yet admit that it is true or proved that for actual service the friction gear must eventually displace the spring gear, and therein lies the real difficulty of an attempt to select a standard. Perhaps this difficulty is less formidable than we think, or is disappearing faster. Perhaps there is a smaller number than we suppose of mechanical officers who do not grasp the vital principles of the friction gear and who do not realize its action in pulling and in buffing. This may well be so, for so many friction gears have been in service recently that some mechanical officers in all parts of the country have had the opportunity to know what they can do. As applied to freight cars they have not been distributed widely, but a good many have been put on locomotive tenders where they have had hard service and their performances there have been carefully observed. Therefore it may well be, as we say, that the mechanical departments are better prepared to accept this form of draft gear than we have supposed. Obviously education in this matter will now proceed fast, for within a few weeks the Baltimore & Ohio has placed an order for 7,400 sets of Westinghouse friction draft gear, and the Pennsylvania has just placed an order for 5,400 sets.

The need of such action as Mr. Westinghouse proposes does not seem to be a matter open for much discussion. It is obvious; we might say it is notorious. The couplings and draft riggings now in common use are inadequate to the heavy service that they are called upon to render, and that service is increasing day by day. At the last Master Car Builders' convention Mr. S. P. Bush said "the capacity of the present draft spring is 19,000 lbs. Very many freight locomotives give a tractive power of 30,000 lbs. or over, so that the draft springs on the train are always solid when the maximum tractive power of the engine is being exerted. It is certainly clear that the incapacity of the present draft gear is conspicuous."

We need not now go again into the attempt to make an estimate of the losses due to defective couplings and draft gear which we carefully discussed about a year ago. Everybody knows that the direct losses in the shape of repair costs are great; but this is only the beginning. Detentions, loss of time of the equipment, use of side tracks and yards, switching costs, all come in to swell the operating expenses due to inadequate draft gear. So far, we have not been able to collect much information as to the relative cost of maintaining friction draft gear and ordinary draft gear at the rear of tenders, but doubtless such information is now of record. A few months ago we learned of one case in which seven six-wheel switch engines having ordinary rear end attachments had run 432,000 miles with a cost for repairs to tender end sills and draft gear of 81 cents per thousand miles for each engine. This was repair cost alone it will be noticed and does not include the loss of service of the engines. Four engines in like service using the friction buffer ran 77,000 miles with no repairs to draft rigging and end sills. Again, two very heavy freight locomotives after running a total of 36,000 miles had the rear end draft gear removed and the sills were badly damaged. The Westinghouse friction draft gear was attached to the same engines which had made at the time of the report 23,000 miles with no repairs, and the tender underframe was as good as new. These are mere pointers and indicate experiences that could be multiplied indefinitely.

The great underlying facts are that engine power, car capacity and trainloads have outgrown the draft gear and that the cost of repairs to draft rigging already excessive will become intolerable in heavy service, unless this part of the working apparatus is improved proportionately with the increase of loads; and, further, that one of the most practicable economies of the future is to be a more efficient use of rolling stock, making each unit do more work, and this involves keeping cars out of the shops, which in turn involves an adequate draft rigging. Finally, we may suggest that with the weights and speeds of freight trains constantly increasing the demand for

brake efficiency constantly rises. One General Manager of a great western road assures us that he is confident that his freight trains reach and maintain for considerable distances speeds of 60 miles an hour; but mechanical officers do not need to be told that brake efficiency is closely allied to adequate couplers.

The Northern Pacific Voting Trust.

The Voting Trustees of the Northern Pacific issued, on November 12 to the holders of trust certificates of the Northern Pacific stock a notice that they have decided to terminate their trust January 1, 1901, and to distribute the shares of stock which they hold in exchange for their outstanding trust certificates. This voting trust was a part of the plan of reorganization of the Northern Pacific dated March 16, 1896. Under its terms the common and preferred stock of the Northern Pacific was delivered to Messrs. J. P. Morgan, George von Siemens, Johnston Livingston, August Belmont and Charles Lanier, and they issued their trust certificates, which are now outstanding. Their trust was to expire November 1, 1901, but the trustees had the privilege of calling upon the holders of the trust certificates to exchange them for certificates of capital stock at any time. Now the trustees say that "by reason of the evidences of financial strength, conservative management, skilful and profitable operation, superior physical condition of the property and the reasonable prospect of continued prosperity of the Northern Pacific" they (the trustees) have decided to terminate their trust and to distribute the stock. The Northern Pacific has already declared 13 dividends on its preferred stock and six on its common. Its published statements indicate the continuance of regular quarterly dividends now established at the rate of 4 per cent. per annum on both common and preferred.

On September 1, 1896, when the new company took back the property, the main line and branches aggregated 4,346 miles in length; now they are 5,667 miles, an increase of more than 30 per cent. In the same time the second track, spurs and sidings have increased over 63 per cent., or from 909 miles to 1,485 miles, and this latter increase is even more significant than the increase in main line mileage as showing the preparation made by the company to deal with traffic.

During the same period the locomotives have increased in number 20 per cent., the passenger cars 33 per cent. and the freight cars 39 per cent. This is in number; but, as our readers know from the intelligent and careful reports made from time to time by the Northern Pacific officers which we have taken pleasure in recording, the increase in locomotive power has been much greater than in numbers, which is also true of the carrying capacity of freight cars. In fact, while the locomotives have increased 20 per cent. in number, the increase in horse power of the road engines is more than 62 per cent., and while the freight cars have increased in number 39 per cent. their carrying capacity has increased nearly 71 per cent. The average trainload of revenue freight increased in the period of the voting trust 69½ per cent., or from 193.5 tons to 328.2. We have been told by those who know, that the new heavy freight engines introduced recently on the Northern Pacific paid for themselves in one year by the increased economy of operation.

During the period from December 1, 1896, to September 30, 1900, the policy of selling the company's lands at much lower prices than had been theretofore asked has been actively carried on, reducing taxes, stopping interest on land grant bonds, increasing population and building up tonnage. The acreage of lands granted by the United States to the Northern Pacific has been thus reduced over 34 per cent., or from 34½ million acres to 22¾ million acres.

During this period the mortgage debt has increased 9.7 per cent. and the yearly interest charges have increased 4.5 per cent., while the average rate of interest on the entire mortgage debt has been reduced 4.8 per cent. All of the outstanding bonds of the old Northern Pacific Railroad Company assumed by the new Northern Pacific Railway Company, amounting to nearly 18 million dollars, have been retired and the mortgages discharged of record. The prior lien 4 per cent. bonds have thus become a first lien by direct mortgage or through the ownership of securities upon 4,975 miles of main line and branches, including extensive terminal properties. The general lien 3 per cent. bonds have likewise been advanced and are now secured by a second mortgage upon the same property that secures the prior lien 4 per cent. bonds. On June 30, 1897, the current assets, exclusive of betterment and enlargement fund, exceeded the current liabilities by 5¼ million dollars. On September 30, 1900, the current assets (exclusive of betterment and enlargement and insurance funds and of the special reserve of three millions for dividends on preferred stock) exceeded current liabilities by 19½ millions.

In analyses of the annual reports of the company from year to year we have noted the continued improvement in the physical condition of the road itself as well as in the capacity of rolling stock and the steady increase in efficiency of operation. With these results achieved and assured the Voting Trustees may look back upon their work as a wonderfully fine example of building up a railroad property; but in considering this accomplishment we must never forget the able and devoted men who have all through these years and indeed through years long before the voting trust, been in actual charge of the property. To the zeal and skill of those gentlemen the results now recorded are due quite as much as to the financiers who in recent times have stood behind them.

The Present Importance of the Siberian Railroad.

In our issue of Nov. 2, p. 724, appeared an article discussing somewhat the resources of Siberia and their possible development. We supplement that article by a note more particularly on the Siberian Railroad itself. The information gathered in recent months does not alter the general conclusion which we have uniformly expressed in the *Railroad Gazette*, that the new railroad is likely to be of overwhelming importance in the development of Siberia, but that as a route for through traffic for the rest of the world, with the exception perhaps of European Russia, its importance is generally greatly exaggerated.

Until the reconstruction of the part west of the Baikal with heavier rails, the steamers will make better time from Japan and China ports to Western European markets than the railroad freight trains, to say nothing of the rates, which by the steamers are now not much more than half as high for the highest classes of freight as the very lowest rate made on the Siberian Railroad to Irkutsk, which is some 2,000 miles short of the Pacific. For passenger traffic the railroad will require about 22 days from London to the Pacific, and steamers 7 to 10 days from the railroad terminus (Dalni) to Hong Kong, while the steamers by the Suez Canal take about the same time. The Russian railroad rates, however, are so low for very long distances (only $54 for the 6,000 miles from the German border to the Pacific by ordinary trains and $72 by the limited express) that with all allowance for subsistence on the long journey and fares through Western Europe, the cost of the journey by rail will be nearly $150 less than the present first-class steamship fare (which is about $320); so that an immediate diversion of the through travel may be expected as soon as the railroad is opened to the Pacific unless the steamers reduce their fares; much more when the railroad has been rebuilt so as to shorten the time by several days.

When that improvement is made tea for Russian consumption and raw silk (the silk industry is but fairly begun in Russia) may take the railroad; but there is no prospect that European staple goods exported to China and Japan will be diverted from the steamship lines. For Siberia itself the most important immediate service of the railroad will be to bring it men to develop its resources and to provide for their wants.

The Russian Government has made every effort to induce Russian peasants to emigrate to Siberia, as an emigration of some kind is indispensable to the development of the country and the prosperity of the railroad. Such settlers were allotted land, timber for houses, farming tools and even loans of money. A very considerable emigration has occurred, but in the height of it last summer, while thousands were on the way, the troubles in China broke out, and orders were given immediately to stop the movement, provide support for those on the way at government expense till they could be carried back, and give them free transportation to their old homes. This was done not because they would be in any danger in their new Siberian homes, which are nearly all a thousand miles or more from China, but because the whole capacity of the Siberian Railroad, and more, too, was wanted for the transportation of troops. The deficiencies of the road were well known, and may be said to have been intended; that is, it was believed that it would answer all demands upon it for some years at least; as possibly would have been the case but for this unexpected outbreak, which for a time makes felt the need of the capacity of a first-class railroad—more than if it was completed to the Pacific; for now everything must be carried down the long Amoor River, which will be closed by ice probably early in November.

Already some forces and doubtless most supplies have been shipped by way of the Suez Canal, and Eastern China can be reached very well that way; but if the construction of the Chinese Eastern Railroad west of the Sungari River is to be continued through the winter, with the larger protective force required by the revolt, the soldiers and their supplies must be hurried forward now to the line of the upper Amoor. Meanwhile the poor immigrants, who have sold everything at their old homes and have nothing to do there, have been camping at Siberian Railroad stations till opportunity is offered to carry them back over the long journey they had just made towards their new homes.

Volume I of the Report of the Commissioner of Education for 1898-99, just issued, gives much attention to the subject of Educational Training for Railroad Service. The contribution in question is by J. Shirley Eaton and the topics treated, nineteen in number, are as follows: Relation of higher instruction to railroad operations, higher mechanical instruction specialized for railroads, civil engineering specialized for railroads, higher commercial instruction specialized for railroads, university and college instruction specialized for railroads, special university railroad course, secondary education for railroad service, instruction combined with work, apprenticeship, gradation in railroad education, general educational agencies of railroads, railroad employees, their different functions and qualifications, railroading a profession, compensation related to ability, railroads justified in providing means of education, public aspects of education of railroad men, answers by railroad officials to a series of inquiries, and railroad school at Breslau, Prussia. Among the authorities quoted are many names familiar to those engaged in railroad service. A summary of the general subject is stated by Mr. Eaton as follows: "Special education for railroad service is an innovation both in education and in railway practice. The subject has only recently aroused the interest its importance deserves. The ideas of railroad men on the subject may be said to be very diverse. To only a limited extent have they crystallized into actual practice. For this reason a treatment of the subject at this time must be largely confined to description of proposed plans rather than extended systems now in use. The bearing of any education on railroad practice is not fully conceded. Experience must always be so large a part of the training of railroad men that special education in schools of railroad practice can at best be only supplementary to the training received in the service. It must be closely related to the work done on the railroad and the plan of organization there prevailing. The largest side of the subject is the training had in the service. This involves the study of apprentice ships that now exist, and the system of promotion and tenure, because all railroad employ is in very large measure apprenticeship. This is true because it is the spirit of railroad organization that all positions in the service are open to the aspiration of the humblest. The subordinate positions are in line for the higher positions and furnish the training for them. The recognition of individual merit, the spirit of professionalism that prevails in the service, the methods of coincident instruction, of disciplining and promoting men, are all essential factors in this great apprenticeship."

The British Board of Trade has issued its report of what it has done during the year to July 27 under the railway regulation act of 1893, in the matter of hours of railroad employees. Since 1895 the number of complaints made has steadily decreased and during the year covered by the present report it was only 41. As in former years, the most numerous complaints in any one class are those made on behalf of signalmen, locomotive engineers coming next. The results appear to be of the same character as in former years; the Board of Trade communicates with the railroad company and after a time a greater or smaller proportion of the grievances are ameliorated. The identity of the complainants is not disclosed to the railroad company. Where a railroad declines to comply with orders addressed to it the Board of Trade will, if it deems the long hours complained of dangerous, take the complaint before the Railway and Canal Commission, but thus far it has not found it necessary to submit any case to that tribunal. If the Board thinks that the hours are not so long as to endanger the safety of the traveling public, it will not take the case before the Commission, although it will entertain requests from complainants who may wish themselves to go before the Commission. In the city of Bristol a locomotive runner on the docks (employed by the city and not by the railroad company) was found to have been on duty on one occasion for 33 hours. The report mentions the fact that the Northeastern had a conference with the representatives of its employees last January, concerning hours, at which an agreement was reached reducing the hours of duty at 127 signal cabins from 12 to 10 a day, and at 21 cabins from 10 hours to 8; and 160 shunters had their hours reduced from 10 to 8. The conciliatory spirit shown by a conference like this is believed by Mr. Hopwood to be one of the causes of the diminution in the number of complaints presented to the Board of Trade.

The Italian railroads in 1891 began the trial of a system of payments for station service as if it were piecework, though it is not easy to understand how this can be done. As the employees, for the most part, were entitled to fixed monthly payments, these prices were fixed so that it might be possible to exceed these wages, and at the end of the month the excess of the earnings by piece work over monthly wages was divided among the station men in certain agreed proportions. The effect of this has been that the men urge keeping down the station force, in order that there may be fewer among whom to divide the surplus of earnings over wages. At the first station where the system was introduced the number of employees had been 75; after a single month's trial of the new system, the station authorities declared that 55 were enough to do the work. From 1893 to 1896, at the 90 stations where the system had been introduced, the number of employees had been reduced from 3,857 to 3,112, or nearly one-fifth. The companies were paying considerably more per man but considerably less for the total station service than by the old system of fixed wages. But there has been some complaint among shippers that the tendency of this practice to leave the stations shorthanded and to delay shipments at times of great activity in traffic; the station men like to have all they can do at all times, which means that they cannot do all the work in very busy times.

Narrow-gage railroads find much favor in France. Of the 26,044 miles of railroad in operation there at the end of 1898, 2,490 miles were of narrow-gage, and of the 2,660 miles of those classed as "local railroads," 1,640 had narrow gages, of which there are three—1 meter, 0.80 meter, and 0.60 meter. Moreover, there were 870 miles of narrow-gage road under construction. Besides this, out of 2,040 miles of street railroad, all but 501 miles were of narrow gages—five different ones—though the

great majority are of meter gage. But British India has still more narrow-gage. At the end of last March the Indian standard gage road (5 ft. 6 in.) was 13,669½ miles; the meter gage, 9,496; and the special gages, 597½ miles. An excellent opportunity for the study of comparative efficiency and economy of broad and narrow-gages will therefore be developed in India. Such a study cannot be safely made however without a knowledge of more facts than can be learned from the annual reports.

Electric Traction on the London Metropolitan-District Railway.

In February, 1899, the Associated Metropolitan and District Railway Companies voted £20,000 for the electrical equipment of 5,000 ft. of line between Earl's Court and High Street Kensington stations. The engineers, J. Wolfe Barry and W. H. Preece, were required to carry out the work on the permanent way without any interference with the running of the ordinary trains and without any electric current passing through the permanent way or subsoil, lest such should interfere with the signaling arrangements. In accordance with these requirements it became necessary to adopt an insulated return, and to do the whole of the construction work in the few midnight hours when the trains were not running. The electrical work was placed in the hands of Siemens Bros. & Co. The electrical conductors, of inverted channel steel, weigh 75 lbs. per yard, and are carried on double petticoat insulators, the jar being taken by a piece of leather. At points and crossings the continuity of the electrical rails had to be broken, but the gap is in no case so wide that contact is not made in front before it is broken in the rear of the train, which is 245 ft. long. The bonding is by copper strip hydraulically riveted. There are two positive and two negative feeders, lead-covered and armored. The power house is of a temporary character and contains two Belliss Siemens sets and two Babcock-Wilcox boilers. The engines are 300 i.h.p. at 380 r.p.m., and the dynamos give 385 amperes at 550 volts. The boilers are each capable of evaporating 9,000 lbs. per hour for short periods.

There is only one train, by Brown, Marshall & Co., and it requires current for about three minutes in 20 minutes. It has a motor car at each end, but only one is used at a time. In the event of this type of train being adopted on the Inner Circle it would of course only want one motor car, because the trains always move in the same direction. The train carries 312 passengers. The weight is: four coaches, 72 tons; two motor cars, 90 tons; passengers, 20 tons. Each motor carriage has four four-pole 26 × 25 Siemens motors, series wound, with armatures built on the axles. Each motor develops a normal draw-bar pull of 4,000 lbs., the wheels being 47 in. diam., and the maximum power about 200 h.p.

The series parallel controller provides twelve arrangements of motors. There are no short-circuit notches, but it is possible to reverse the motors whilst the train is running. The throwing of the motors against the train is not intended to be used in general practice, all the braking being done by a "Standard" air-brake, the air being supplied by an electric three-throw pump, which also supplies air for the whistles and sanding gear.

Current is collected from the conductors by 14 (seven on each side) cast-iron shoes suspended from the bogies by insulated bolts. The springs are adjusted so that the bearing pressure is about 10 lbs. When fully loaded the train has started on a 1 in 43 gradient—a feat which an ordinary steam locomotive was unable to perform when hauling a similar load. Owing to the simplicity of the driving arrangements it has been found unnecessary to employ specially trained drivers. Maximum speeds of 38 to 39 miles an hour have been reached.—*Science Abstracts.*

Railroads in Persia.

BY H. L. GEISSEL.

The Shah's visit to the Paris Exposition and his journey through Russia, Germany, Belgium and France have again drawn public attention to the development of his country. A prime influence towards this end is the establishment of means of communication. In the first place, the almost absolute unaccessibility of the interior of the country, which is crossed by extensive chains of mountains, has to be taken into account. In the whole of Persia there are but two wagon roads in our sense of the word, that from Kuma to Teheran, and another one leading from Teheran to Meshed. Both have a total length of 1,325 miles. The scarcity of passable roads is the more fatal as there are but two seasons in Persia, a very hot summer and the winter. During the time of the snow melting, which occurs in the most abrupt manner, every communication is stopped. The caravan routes are inundated and impassable so that caravans have frequently to lie for weeks on the fields, not being able to move forward or backward.

Under such conditions there can be no question of opening up the country. Neither can the exceedingly rich coal and mineral deposits be exploited as long as this state of affairs prevails. The same conditions have to be reckoned with in regard to the exploitation of all other natural resources.

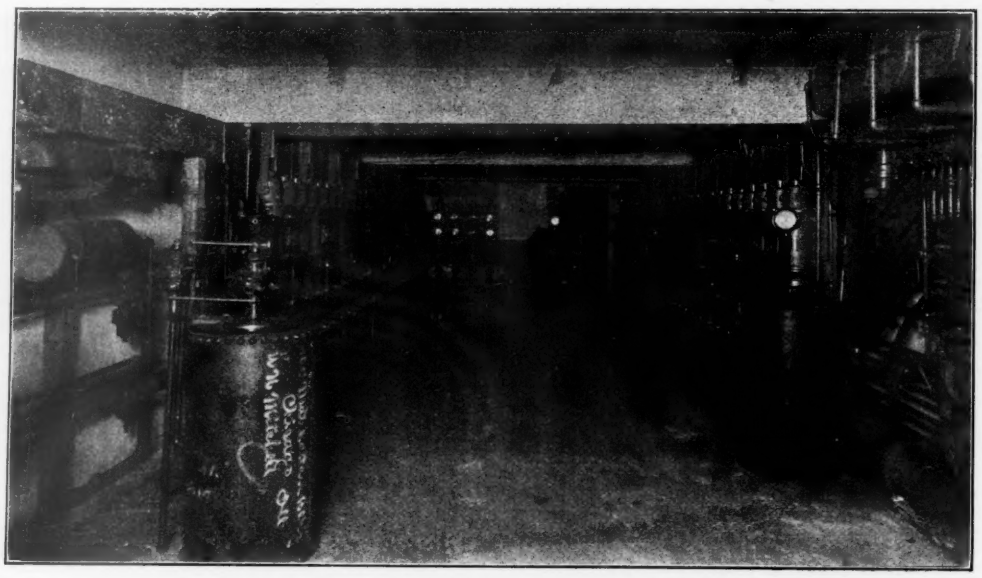
Though the more progressive men in Persia want railroads, it must be remembered that the greatest revenue of the population is derived from the caravan traffic, the rapid destruction of which would deprive a large majority of the people of their livelihood. The existing enterprises founded by Europeans are simply of a local importance, without being capable of extension to any degree. Neither have the Belgians succeeded in deriving any financial results from attempts to build tramways and the small railroad line from Shah-Abdul-Asim to Teheran (6.6 miles in length), nor have other Belgian enterprises such as silk mills, glass works, etc., showed any profits. Most of these enterprises have of late passed into Russian hands, as Russia now generally controls Persian matters. Thus, the Russian Empire possesses the exclusive right of building railroads, roads, etc., in Persia. The connection of the Russian railroad system with the Gulf of Persia was started last year.

The first steps towards the construction of railroads leading to Persia were taken last year by the commencement of work on the line Alexandropold-Eriwan, which is to be extended to the city of Tabris, the principal commercial center of Northern Persia. Simultaneously with the building of this railroad, surveys for an extension of the railroad from Baku along the shore of the Caspian Sea to Lenkoran, to the port of Astarah, and to the city of Resht, were carried on.

Besides their importance for through traffic the projected railroads have still another important issue. The Russian industry has assumed large proportions during the last few years, and in many instances is not able to meet the demand for raw material by home production. Thus, the annual demand for copper amounts to about 164,000 tons, whilst the home production does not exceed 50,000 to 57,000 tons. The projected railroad leads through Karadagh, the richest district of the entire country in valuable and extensive deposits of copper, lead, iron and silver ores.

Air-Brake Instruction Room at Chicago.

The International Correspondence School will open its new air-brake instruction room in the basement of the Manhattan Building, Chicago, Tuesday evening, Nov. 20, when there will be short lectures by a number of prominent air-brake men. This room will accommodate about 60, and it is intended for the same kind of work as is now being done in the air-brake instruction car. Such a room is warranted by the large number of students the school has enrolled on the Chicago roads. Instructors will be present both during the day and evening, and there will be three stereopticon lectures a day; one at 10 a. m., one at 2 p. m., and one at 7:30 p. m. These lectures will be followed by further instructions using the air-brake rack, sectional models, and other apparatus. Students will be free to use the apparatus at all times in connection with their studies.



60-Car Air Brake Rack of the International Correspondence Schools at Chicago.

The air-brake equipment is all Westinghouse and is very complete. There is a brake-rack representing a train of six passenger cars fitted with Westinghouse high-speed brakes with gages on the brake cylinders and auxiliary reservoirs. This rack is operated by connecting up to a full engine equipment consisting of an engineer's brake valve, driver brake and tender and truck brakes, such as is used in connection with the high-speed brake. There is air signal apparatus for ten cars. The freight brake rack represents the brakes, piping and connections for a 60-car train which is ten cars more than is usually provided. These brakes are placed vertically and mounted, one deep, on a frame, at the sides of the room. About one-third of these brakes are fitted with gages to show brake cylinder and auxiliary reservoir pressures. This rack is operated by a brake valve near the instructor's stand, and the piping is so arranged that a number of combinations are possible, including an arrangement where there are two engine equipments at the head end; that described in connection with the high-speed apparatus, representing the second engine when the rack is so worked.

There is a complete set of sectional or skeleton brake apparatus, where the moving parts are connected by light rods or links to working apparatus, so that the movement of any working part is shown by a similar movement of the corresponding part of the sectional model. The equipment connected up in this way consists of an engineer's brake valve, a plain triple and a quick action triple. Each triple is connected to sectional reservoirs and brake cylinders, and even the brake cylinder piston is connected to the piston of a working cylinder, so that they move together. On this skeleton brake rack there are also nine triples known to have different defects, and this short rack can be worked with the 60-car rack if desired. The pump equipment includes sectional 8 and 9-in. Westinghouse air pumps, and a working 9½-in. pump, the valves of which are connected tandem to the valves of a duplicate head mounted above the steam cylinder. Beside these there are numbers of triple valves, engineer's brake valves and similar parts which can be taken apart and examined, most of which are sectioned. The air for working the brakes is furnished by an Ingersoll-Sergeant compressor. The accompanying engraving shows a view of the large rack.

Our Locomotives and the Englishman.

Following are a few extracts from one of several articles by a staff correspondent of the *Times* (London), after a visit to various locomotive building shops of America. The articles were published under the head of "American Engineering Competition."

"In competing with British-made locomotives in neutral markets, the American system gives the maker a considerable advantage in the matter of price. So far as Great Britain and the United States are concerned, it may be said that each type is well suited for its respective field, but when we come to those neutral markets where locomotives are most likely to be imported we see that the British maker who sticks with British pertinacity to his own home ideals, is likely to go to the wall. New countries, our colonies, for instance, have railways more approximating to the earlier roads of America than to the solid constructions of our own land. It has been more than whispered that, in the past, British makers have shown what might be described as obstinacy rather than pertinacity. They have been apt to think themselves masters of the situation and to tell their customers exactly what they proposed to supply rather than consult their wishes. 'We make only good engines; turn out nothing but high-class work,' they have said. 'That is what we consider a good, substantial locomotive, and if you want anything else you had better go elsewhere.' Foreign customers have taken this advice, getting, perhaps, an engine not so bright, not so good-looking, not so economical in fuel, but one which may have cost less, and which undoubtedly hauled big loads over roads that were as different from our splendidly laid and tunneled lines as a New York street is to a Parisian boulevard.

"Still, at the present time, Great Britain leads the world in its foreign trade in locomotives; but it will be seen that we do not hold our supremacy on a very certain footing, for one of our annual totals has already been exceeded by an American total, though not in the same year. It is, however, somewhat remarkable and, in some respects, not a little creditable to the British makers that they hold their own as well as they have done, for they have not the same advantages as the makers in the United States. As is well known, the chief British railway companies have extensive shops for the manufacture of railway engines, thus doing a large part of their own work. In the United States the same conditions do not prevail, the railroad companies as a whole more largely depending for their supply on the locomotive firms. The most notable exception is that of the Pennsylvania Railroad Company, which has most admirably arranged shops at Altoona. The American private firms do, therefore, an enormous trade, and, what is of even more importance, the demand is fairly constant. Our own export trade is of a fluctuating character, as will be seen by the figures al-

ready quoted, and, unfortunately for our locomotive makers, the home demand is apt to ebb and flow in unison with the foreign trade. The year 1899 is an example, for, while the foreign demand has been comparatively high, the home railways have been asking contractors for more locomotives than they could supply. The consequence has been importation of American-built engines into England, whilst we are sending large numbers of British-built engines abroad. The position is unfortunate. The locomotive makers say demand fluctuates to such an extent that they cannot keep their men together in dull times so as to be able to execute orders for a rush. Moreover, they do not feel inclined to invest an increased amount of capital in costly machinery, buildings, and appliances, when the money would so often be unproductive, the machinery lying idle. 'If,' they say, 'we had more of the home railway supply in our hands, it would act as a fly-wheel to the trade, and fluctuations would bear a smaller ratio to the total demand.' It is also complained that railway companies put off making purchases unduly, and in this way the locomotive stock is let down to such an extent that it has to be renewed with a rush."

Speaking of the Baldwin Locomotive Works, the writer says:

"The executive officers of these works pride themselves on a system they have formulated by which orders can be quickly executed, and by no means a small part of the strength of the business lies in this fact. On the occasion of my visit the last of an order for nine engines had recently been dispatched. These had been wanted in a great hurry, and special pains were taken to finish them in the specified time, which was 14 days from receipt of order. The first shipment of two was made within ten days, and the others were all delivered within the time named. As the shops were all extremely busy there was no material in stock, but the engines were of a design previously worked to, so that drawings had not to be made. Plates of required size for the boilers were ordered by telegraph. A man was sent off by the next train to see that no mistake was made and to carry out the usual tests. All boiler plates, it may be added, are drilled to pattern in accordance with a definite system. A word should be said about those who go out to inspect work in progress. They are picked men, as it is considered that quick delivery—always a feature of supreme importance in America—largely depends on their exertions. They not only have to see that the materials comply with the specification, but also to take care that the firm's work gets its fair turn, that it is not unduly put on one side to favor other orders.

"It need hardly be said that there are no trade union restrictions here as to the number of machines a man may look after. He takes charge of just as many as he can get entrusted to him. With the system of piecework in vogue, there is, of course, no opposition to labor-saving machinery. Most of the ideas for economizing labor come from the men who work the tools. Mr. Vauclain, who takes the management of the works, and who most kindly devoted a great deal of time to going round the shops with me, said it is a common thing for a man working on a machine tool to suggest improvements which will expedite the work."

The Explosion of a Locomotive at Westerfield, England.

Last week we gave a short account of the explosion of freight engine No. 522, Great Eastern Railway, at Westerfield, England. A further statement of the circumstances is here given from *The Engineer*, with illustrations that were offered in evidence at the inquest:

The engine in question—nearly new—had just hauled a rather heavy goods train up an incline. The safety valves were set at 160 lbs. When the explosion took place they were blowing rather freely.

The fire-box was stayed as illustrated in the engravings. The stays are sawn off to the required length, drilled, screwed, grooved, and the end A radiused in the lathe before the stay is put into the position shown. The stays are screwed in through the wrapper-plate (the shell) radiused end first, by the specially constructed stay-driver B, which is also provided with an arrangement for extracting the stay should it happen to be too tight in the plate. One end of the stay is screwed into the driver, and when the set-bolt (*b*) is tightened up, the frictional resistance between the stay and the cutting edge of the claw (*a*) is sufficient to turn the stay into position. If the stay is too tight in the plate it can be taken out by forcing the claw (*a*) further into the end of the stay, and turning the driver in the opposite direction. When in position the stay is expanded at both ends with the drift C; the wrapper-plate end is then radiused by the pin-drill D. The four grooves or slots are milled 1-16 in. wide, and 7-16 in. deep, measuring from the top of the threads. They extend along the center of the stay towards the ends, and are terminated not less than 1-16 in. from either end of the finished stay.

Various stays taken at haphazard out of a lot and broken from time to time, as the numerous engines of this group were built, gave very uniform results. Each stay was good for about 12 tons. The effect of the sharp thread was discounted on the Palisser system by the drilling of holes in the ends of the bolts. It is, however, quite unnecessary to discuss the strength of the bolts, because not one of the side bolts were broken. They were all pulled through the plate. Some of the stays in the fire, or quite close to it, had leaked. These were re-drifted, and leaked again. Then their ends were knocked up, as we have said. But it will be seen from the drawing that, after all, the stays depended for their holding power entirely on the screwed threads. There is reason to believe that riveting will augment the hold of a screwed bolt by about 30 per cent. In the present case, however, there is no ground for thinking that riveting was necessary. The maximum stress to be brought on each stay bolt was about 2,720 lbs., or less than one-sixth of the stress which would suffice to tear the stay out of the plate.

These being the conditions, and the plates not being overheated, we have to explain how the plate could have been pulled, as it undoubtedly was, off the stay bolts. The only hypothesis advanced was that the screw threads on the stays did not fit some of the holes. But nothing in explanation of this came out in the evidence, and as all the stay bolts are screwed, and the holes tapped originally to standard sizes, it is very difficult to see how the stated imperfection of fit was brought about. The assumption is that the plate gave way at the side under the water level, indeed quite low down; that it ripped inward, tearing away from the stays until the ripping reached the crown. Now, at this time, the strip torn must have been free of the foundation ring—from which it was ripped in a very curious way it will be seen, the line of fracture not passing through the rivet holes—and we have the plate somewhat in the condition shown by the accompanying rough sketch, Fig. 1. Here, A A are two fore-and-aft bridge

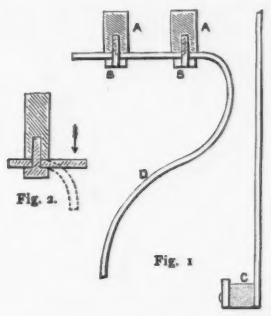
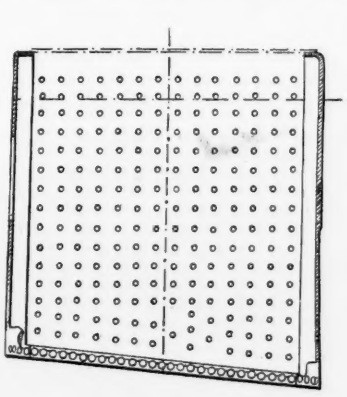
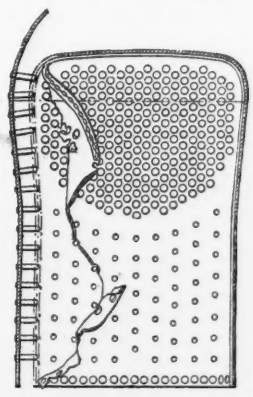


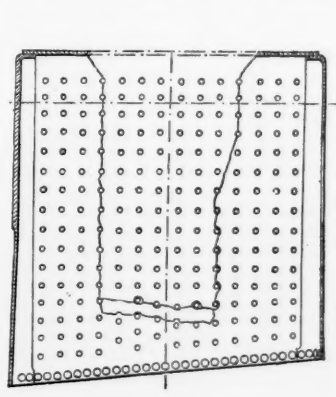
Fig. 2. Fig. 1

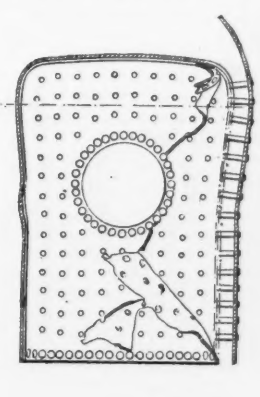
stays, to which the crown of the box was held up by bolts with hexagon heads B B. At C we have the foundation ring and the side of the outer fire-box. As we stated last week, 88 of the bolts B B were broken off just at the place where the plate D touches the crown stay. As each of these bolts would carry at least 12 tons, we have a total resistance of 88 x 12 = 1,056 tons, overcome in a moment. It is urged that the plate was ripped away from the bolts one after the other. But this appears to be entirely impossible. Let us suppose that a strip of copper, half an inch thick and 5 ft. long, is bolted at intervals of 4 in. to a bridge stay, as in Fig. 2. Now, let the stay be carried at each end and fixed, and let a uniform pressure be applied from end to end in the direction of the arrow. It is at once obvious that no pressure could be applied which would rip the plate from the girder stay. The plate would simply bend as in the dotted line. This is enough, we think, to show that the ripping away theory cannot be maintained. As we said last week, the Colburn theory will not apply here. There was no water to be thrown like a projectile down on the crown plate. The complete catastrophe points to this sequence of events: (1) A rent is made in the side of the box, through which water rushes out; (2) the pressure in the boiler being reduced, a portion of the water is flashed into steam; (3) this flashing process being once started, it goes on, until in the twinkling of an eye a pressure is produced great enough to tear up the fire-box as shown in the engraving.

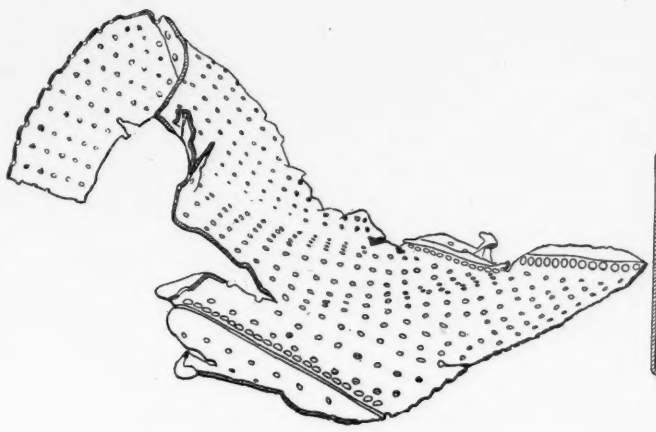
So far as the Westerfield explosion is concerned, the only lesson to be drawn from it seems to be that it is always well to rivet over the heads of side stays.

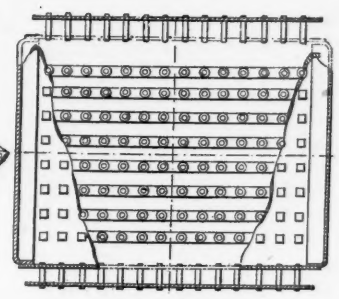

Wrapper Plate—Left Hand Side.

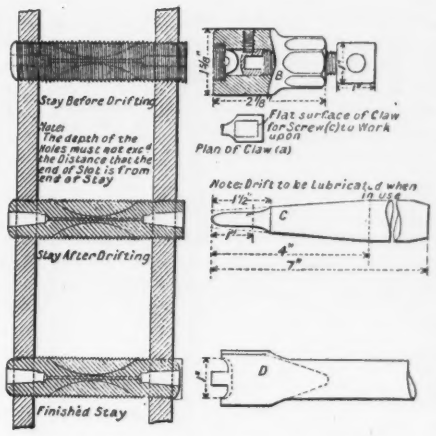

Tube Plate.


Wrapper Plate—Right Hand Side.


Back Plate.


Portion of Wrapper Plate Blown Out.


Wrapper Plate Crown.



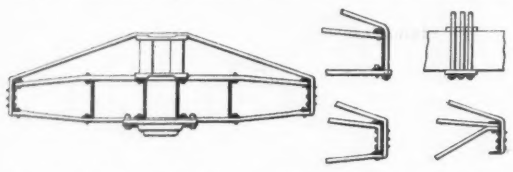
Great Eastern Boiler Explosion at Westerfield, England.

We have heard it intimated that certain railroad companies have owned a legislature, but the Chinese Eastern is probably the first railroad company to own an army. Last August it had recruiting agents in Western Russia

enlisting men who have served their time in the Russian army for a force of infantry, cavalry and artillery. The men are enlisted for three years with what are in Russia high wages. It is significant as to the capacity of the Siberian Railroad that these men are sent not by rail but by steamer from a Black Sea port.

Body Bolster for Hopper-Bottom Cars.

Mr. H. S. Bryan, Master Mechanic of the Duluth & Iron Range, has designed and patented a body bolster for hopper bottom cars, which is a combination of plates, or of plates and rods as shown by the accompanying engravings. The drawings show the car sills to be steel chan-



nels, but the construction is applicable to wood sills as well. The bolster consists of two plates, one above and one below the sills, which are strengthened by a truss formed of either a plate or of several rods. Different methods of making the end connections are illustrated. This construction is considered more rigid and durable than ordinary two-plate body bolsters, and yet not so expensive as other special bolsters for hopper cars.

TECHNICAL.

Manufacturing and Business.

Thornton N. Motley & Co., New York City, have shipped to Manila for the United States Government $30,000 worth of road making machinery. The machines were made by Kilbourne & Jacobs and the Enterprise Mfg. Co.

E. L. Maxwell, formerly with Dilworth, Porter & Co., Pittsburgh, Pa., is now associated with Henry Levis & Co., of Philadelphia, with an office in the Empire building, Pittsburgh. He will continue to handle all kinds of railroad track material.

On Oct. 27, the shops of the Paige Iron Works Co., Chicago, were completely destroyed by fire and new works will be erected at once at Harvey, Ill. It is expected that these will be in operation by Jan. 1, and in the meantime the offices will be at 917 Monadnock Block, Chicago.

The firm of Leach, Simpson & Collier dissolved Nov. 1 by mutual consent. Mr. W. M. Simpson and Mr. F. P. Collier, with offices in Old Colony Building, Chicago, will individually represent the United States Bronze Co., of Cleveland, Ohio, and the Corning Brake Shoe Co., of Corning, N. Y., in Chicago and adjacent territory. Mr. P. F. Leach will have the representations in Pittsburgh and vicinity.

James L. Taylor has been elected Third Vice-President of the Consolidated Railway Electric Lighting & Equipment Co. He was, until recently, the General European agent of the Pennsylvania Railroad in London; and previously had railroad experience in this country, having served in prominent positions on the lines forming the Plant and Southern Railway systems, before entering the service of the Pennsylvania. He is well known in this country as a railroad man; and, during his residence abroad attained an enviable position in the social and railroad world. He was President of the American Society in London, and was connected with the American Commissions at both the Brussels and Paris Expositions, and for his services at the first named he has the decoration of the Order of Leopold.

Iron and Steel.

The Bethlehem Steel Company has again opened an office in St. Louis, Mo., and will be represented at 930 North Main street, that city, by S. E. Freeman.

The proposition of the Carnegie and Bethlehem Steel Companies to provide Krupp and Harveyized armor to the Government, at $475 a ton, on contracts calling for about 37,000 tons, will, according to dispatches from Washington, be accepted by Secretary Long.

We recently announced that British railmakers had reduced the price of rails. The following is from the *Mechanical Engineer* (London): "In consequence of American competition, the steel manufacturers in this country have conferred with the view of adopting protective measures to prevent orders going across the Atlantic. For some time past the British Steel Rail Makers' Association has kept prices up at £7 to £7 5s. per ton for ordinary heavy sections; but Americans have recently been underselling them, and now the home makers have relaxed their conditions and given freedom to makers to lower their prices at once. This has been done, and some makers are quoting as low as £6 10s. per ton net f. o. b. for heavy sections, while probably large consignments could be booked at £6 per ton. These prices will shut out American competition, and if makers can work their mills at a profit at these prices, they can get a very large number of orders from foreign countries. It is noteworthy that during the week there has been a drop of 15s. in the price of ship plates. The steel plate department has been quiet for some time, for the Americans have been securing orders at lower prices than British makers have been quoting."

Heavy Electric Traction.

Oct. 12 a trial was made at Budapest before a large number of Hungarian and Austrian railroad men, including the Austrian Minister of Railroads, of a section of railroad equipped by Ganz & Co., to move ordinary heavy trains by electricity. Little is said of the system used, except that it employs a current with high tension. The builders have a contract to equip with it a line 41 miles long on the east bank of Lake Como in Italy, between Lecco and Chiavenna, with a branch 25 miles to Sondrio, which has been worked by steam several years. There 4,000 h.p. water power will be utilized. It is to be in working order next spring.

Acetylene Lighting on the Chicago, Milwaukee & St. Paul.

The Chicago, Milwaukee & St. Paul expects to equip three passenger cars with acetylene gas generators for experimental purposes. As noted in our issue of June 15, the St. Paul has been experimenting with different forms of acetylene generators in the chemical laboratory at West Milwaukee, and the service tests are intended to supplement the laboratory work.

Atlantic Type Locomotives of the Burlington.

In a recent pamphlet of the Baldwin Locomotive Works, letters from Mr. Delano, of the Chicago, Burlington & Quincy are published regarding the performance of the two large Atlantic type passenger engines which have been in service since April, 1899. Engine No. 1,592 was put in service April 6, 1899, and on April 26 of the following year was sent to the shops for general repairs; the total mileage made during this time was 127,478 miles. Engine No. 1,591 was put in service April 7, 1899, and up to July 30, 1900, when withdrawn from service for general repairs, it made 160,806 miles. It is thought that engine No. 1,592 could have made a similar record had it not been that it was undesirable to shop both engines at the same time. After making 160,806 miles the tires of No. 1,591 are said to show about the same wear as do the tires of the average class "H" mogul engine after a service of 50,000 miles. Mr. Delano says, "The ease with which these engines do their work is the most satisfactory thing about them."

The Block System in Italy.

Only a beginning has been made in Italy with the block system at two or three stations on short sections, and on the 88 miles between Genoa and Turin. Elsewhere trains are run on the antiquated time interval plan, with the resulting accidents. Where men are so plenty and cheap, this is the more remarkable.

The Bonzano Joint.

The Bonzano joint has been ordered on a good many railroads, including 25 miles on the Southern Pacific, an order of some importance on the Chicago & Alton and some of the Wisconsin lines. It is expected that within the next six months four or five hundred miles more of road will be equipped with this joint.

The Simplon Tunnel.

The Simplon tunnel advanced in September 481 ft. at the north end and 409 ft. at the south end, making the total penetration at the end of the month 21,265 ft.

THE SCRAP HEAP.

Notes.

Chicago papers announce that the Chicago, Rock Island & Pacific will hereafter manage all of the eating houses at the stations on the line of its road west of the Missouri River. The department will be under the supervision of Mr. Stewart, Superintendent of the dining cars.

The United States Circuit Court of Appeals at St. Paul has affirmed the decision of the Lower Court against the Northern Pacific, requiring the road to desist from building earthworks which interfere with the navigation of the Red River at Grand Forks, N. D. The track of the company along the bank of the river, at the point in question, began some time ago to settle, and to bring it up to the proper level the company filled in a large quantity of earth; but the weight of this caused an under stratum of clay to flow laterally, so as to make a bar in the river, obstructing navigation. The Court approves an injunction against the completion of the embankment, which, however, has a proviso permitting the embankment to be built if the company maintains a suitable channel in the river.

Traffic Notes.

The General Passenger Agent of the Bangor & Aroostook Railroad announces that during the month of October the number of deer shipped from stations on the line of that road was 1,588, and of moose, 83. Nearly one-third of the deer came from Greenville, which is the outlet of the Moosehead Lake country.

The League of National Associations is to hold a convention at St. Louis, Nov. 20, to consider what can be done to get the Cullom bill passed at the next session of Congress. This League is composed of the National Board of Trade, National Grange of the Patrons of Husbandry, various State millers' associations, and numerous other commercial bodies, including the Boards of Trade of many cities.

The Lake Shore & Michigan Southern, to stimulate suburban traffic at Chicago, is giving free rides to the women of Hyde Park. Agents are to visit the district between Michigan avenue and the lake between 39th and 43rd streets and leave at each house time cards of the company's service, with a ticket good for a ride one way attached. These tickets will bear no limit and be honored when presented with the time card.

The United States Court at Little Rock has granted a temporary injunction restraining the State Railroad Commissioners of Arkansas from enforcing a tariff which they have prepared for the Little Rock & Hot Springs Western Railroad. The same court, in the case of the Arkansas Railroad Commissioners against the St. Louis, Iron Mountain & Southern and the St. Louis Southwestern, has decided in favor of the Commissioners, the complaint being that the railroads neglected or refused to carry out the joint freight tariffs prescribed recently by the Commissioners. The statutory penalty for this offense is $500 a day.

High Carbon Steel for England.

Consul Marshal Halstead writes from Birmingham, October 18, 1900, that he is in receipt of a communication from a steel company which contains an inquiry for American steel for making forks (hay, digging, coke, etc.), Siemens or Bessemer process, and requests the names of firms making high carbon steel of this sort.

Russian Coal Rates.

The Russian Government has just abolished the exceptional rates granted for the transportation of coal from the Donez-Dombrowa district to foreign countries. This is on account of the scarcity of coal in Russia. The Government simultaneously abolished the preferential rates hitherto in force for coal shipments on the Warsaw-Vienna Lines. The latter privilege consisted chiefly in the Government having cancelled the taxes which had to be paid at the frontier stations on each pood (36 lbs.) on coal, amounting to 33 kopecks. This tax has now been introduced again.

Two Proposed Railroads in Chile.

The Chile Department of Public Works on July 13 published a decree approving the plans and specifications for a railroad from Talca to San Clemente. Bids have been asked for building the road. Full information can be obtained from the Department of Industry and Public Works at Santiago.

Mr. Norman Walker has been granted a concession for himself or companies that he may organize, to build and operate a steam road from the mining district of Chuquicamata to connect with the Antofagasta & Bolivia R. R. Plans must be submitted to the President within six months from July 30, 1900, and the building of the road completed within 18 months from the approval of the plans.

Plan for a Railroad in Salvador.

Mr. Henry C. Stuart has submitted a plan to the Government for building and operating a railroad connecting San Salvador with La Ceiba de Guramel, where it will joint the Sonsonate line to Santa Ana.

River Improvements in South America.

The work of improving the rivers of the State of Tabasco, in Argentine has been begun. As soon as the beds of the rivers have been cleared of fallen trees, etc., channels will be dug, for which dredges will be needed.

Dredging machinery will be required at Para, Brazil, if the undertaking of deepening the channel of the Para River is to be accomplished.

The Government of Chili has obtained from Congress an appropriation of $210,000 to buy a dredge for Valparaiso and two smaller dredges for rivers in the southern part of the Republic.

Russian Cars.

The average cost of the freight cars on the Russian Railroads in 1897 had been $670. Their average capacity was 25,261 lbs. Nearly all were four-wheeled cars, two-thirds were box cars, and only 27 out of 215,000 were equipped with power brakes. Nearly one-fourth of the passenger cars were eight-wheeled and nearly two-thirds were six-wheeled. Their average capacity was for 37 passengers. Most of them were equipped with power brakes, chiefly Westinghouse. Of the seats for 375,000 passengers in the Russian passenger cars in 1897, 64 per cent. were second-class, 7½ per cent. fourth-class, 18 per cent. second-class, and 6⅔ per cent. first-class. The prison cars had accommodations for 11,776, nearly half as many as could find seats in first-class cars.

The Portuguese African Railroad.

From San Paulo de Loanda, on the west coast, 9 deg. south of the equator and 200 miles south of the Congo, eastward to the Lucalla River, 226 miles, is now open throughout. It was a costly line to build, crossing low ground liable to overflow and requiring many bridges. The embankments first made had largely to be elevated, and the location of some change entirely. Of meter gage, the line has cost more than $100,000 per mile. The chief traffic sought is coffee and india rubber. There is one train each way daily, and no risks are taken by running fast or in the dark. The train starts in the morning, runs 12 hours, stops over night, and completes the trip the next day, having been 36 hours on the road, and running less than 10 miles an hour. At the night stopping place there is a hotel with six beds; but you are allowed to stay in the car (which has no berths) if you prefer. The fares are about 3½ cents per mile, third-class, 7 cents second-class, and 14 cents first-class. Freight rates vary from 5.7 to 23.7 cents per mile. The largest earnings of the road (which was before it was extended to the Lucalla) were $224,000, in 1896-97. The next year they were $32,000 less.

The War and the Chinese Eastern.

Heretofore there have been no definite accounts of the damage done to the Chinese Eastern Railroad (which the Russians are building) by the recent uprising. It is known that construction of this road began at an interior point, of Manchuria, Charbin, to which materials were brought by way of the Sungari River, a tributary of the Amoor. It seems that for nearly 100 miles east of this point, to Zozikar, the Chinese have destroyed all the bridges, which is the chief damage. The rails, for the most part, they buried, without moving them far. The one tunnel on this section is uninjured. On the branch to Port Arthur the destruction is much more complete, the embankments themselves having been leveled in places and the stations as well as the bridges burned. A section 42 miles long to Mukden will soon be in condition for trains. Nearly all the earthwork on the whole of this railroad was done by Chinese, and if the insurrection puts an end to their working, which the hostility of their countrymen may make inevitable, it must be very difficult to get laborers to complete the road. Siberia can supply scarcely any, and the Russian immigration has been nearly all of families settling on lands.

Taking What the Traffic Will Bear.

A Russian paper is responsible for the following tale: A merchant in Irkutsk had a carload of fruit to ship to Chita, over the Siberian Railroad, for which he paid $85 for freight and $60 for "lubrication" of various railroad

men through whose hands the car went. When he had paid his freight and loaded the car in Irkutsk, an official told him the car was out of order and must be sent to the shops, and would be gone at least a week, but when the shipper slipped a good-sized banknote into his hands, the inspector concluded that the car might pass. But at the next station the same complaint was made and the same method of silencing it employed and so on to the end of the route.

The Dahomey Railroad.

French papers report that work on the Dahomey railroad is being carried on fast, and that four of the principal stations, Komotou, Paou, Allada and Abomey, are so far completed. The *Journal des Transports* states that plenty of native labor can be had. The natives, by the thousands, offer their services at the rate of from 10 to 20 cents a day.

A "Luxury Train" for the Trans-Baikal.

The St. Petersburg Car Works have turned out for the Trans-Baikal line of the Siberian Railroad a fine train of five cars, one of which carries first-class, and two cars second class passengers, whilst the fourth is a parlor and the fifth a dining car. They are connected by vestibules. The furniture is of mahogany, and the parlor car is provided with a piano. Each compartment of the first-class car has accommodation for four passengers. The train, which arrived at its destination in October, was built at a cost of about 100,000 rubles, or about $52,000.

Rolling Stock for the Prussian State Railroads.

The *Cologne Gazette* says that the Administration of the Prussian State Railroads will increase their rolling stock during the working year 1901-02 by 9,600 freight cars and a large number of first, second, and third-class passenger cars. The fund available for the special purpose of acquiring rolling stock is still very large, and there is every probability that the number of freight cars to be purchased will exceed the above amount by some thousands. In December, 1900, alone the Administration will place orders for 8,000 freight cars and about 1,000 passenger cars.

Railroad Building in Austria.

The Austrian Government purposes to undertake the construction of a considerable number of important new lines, requiring the expenditure of about $100,000,000 within the next five years. The most formidable of these undertakings is a line through the Alps which will give a shorter connection of Austria and Germany with Trieste, Austria's sole port. For this a tunnel under the Tauren Alps, 27,697 ft. long, will be required, one under the Karawauken 25,973 ft. and one under the Wochein Alps, 20,813 ft. long. The time for the completion of this road is set for 1907. Great efforts have been made to cultivate Oriental traffic through Trieste, but business seems to prefer to go north to Hamburg and then almost circumnavigate Europe. Besides, Fiume, Venice and Genoa compete with it on the Mediterranean side.

Tests of Road Material.

The Secretary of Agriculture has established in the Division of Chemistry a laboratory for testing physically and chemically all varieties of road materials. These substances include rocks of all kinds, gravel, shells, brick, clays, and other bodies used in road building in country districts, but do not include materials for municipalities. This laboratory will be ready for operation about the 1st of December. Any person desiring to have road materials tested in this laboratory is advised to write to the Office of Public Road Inquiries, Department of Agriculture, Washington, D. C., for instructions in regard to the methods of selecting and shipping samples.

Good Roads.

National Good Roads and Irrigation Congresses will be held at Chicago, Ill., Nov. 19 to 24, inclusive. The calls are signed by W. H. Moore, President of the State and Interstate Good Roads and Public Improvement Association, of St. Louis, Mo.; George H. Maxwell, Chairman Executive Committee, National Irrigation Association; the Mayor of Chicago, and the Governor of Illinois. The Irrigation Association will meet in conjunction with the Good Roads Congress. The first three days will be devoted to road improvement and the last three days to irrigation. During the present season road conventions have been held in the larger cities of the States throughout the Northwest. The objects of the Chicago meeting are similar to those of the other Western conventions, i. e., to promote more general interest in the improvement of the public roads, to discuss the best methods of building and maintaining them, and to promote good roads legislation in the various states. The railroad and other transportation companies are especially invited to send delegates.

"If Not True Well Invented."

A steel freight car fully loaded fell from a trestle into a river in Indiana a few days ago and instead of sinking floated like a barge.

A Royal Breach of the Rules.

On the 29th of June His Royal Highness, the Prince of Bulgaria, was permitted to ride on the locomotive of the Orient Express and afterwards sent to the engineman and fireman a present of 60 francs and 30 francs respectively. The Director-General of the Royal Bavarian State Railroads has issued an order that the 90 francs should be recovered and sent back to the Marshal of the Court at Sofia and that the engineman and the guard of the train should be reprimanded for not having drawn the attention of His Royal Highness to the fact that it was against the rules to permit anyone to ride on the locomotive.

Railroads in West Africa.

Mr. Frederic Shelford, of the firm of Shelford & Son, engineers, who are intimately associated with West African railroads, has given some particulars of the progress of railroad construction in that part of the world: "There is probably more development taking place in West Africa at the present time than in any other of our possessions. Interest is chiefly centered upon the Gold Coast, where a stabie gold mining industry is springing up. The much discussed Sellondi Tarkwa Railway is to be extended to Kumasi, partly upon the route explored by myself in February, 1899. It will serve an auriferous country, and will be guaranteed by some of the gold mining companies chiefly benefited. This railroad will be 180 miles long, 3 ft. 6 in. gage, through dense tropical forest. The route is far from easy, the country being much broken beyond Tarkwa. A large survey party left Liverpool on Oct. 13. This party will be occupied upon the survey alone, but as they proceed, construction work will be begun at many places at once. The difficulty with this line is the scarcity of labor and food, but it is anticipated that the many recruiting agents now at work will raise the 10,000 men required. At Lagos the three steel bridges connecting Lagos with the mainland are finished, and the railroad is about to be opened at Ibadan. The line is 126 miles long, 3 ft. 6 in. gage. It connects Lagos, Abeokuta and Ibadan with populations of 60,000, 150,000 and 180,000 respectively. The chief works are the Carter Bridge, 2,000 ft. long, the Denton Bridge, 900 ft. long, and the Ogun, Oyan, Opeki and other bridges. The further extension to Ogbomisho, Ilorin and the Niger is under consideration. At Sierra Leone a further section of the 2 ft. 6 in. railroad has been opened as far as Rotifunk, and the extension of 80 miles to Bo, with a gradient of 1 in 35, has been begun."

The St. Louis World's Fair.

Vice-President and General Manager Ramsey, of the Wabash, has issued the following circular:

"To Heads of Departments and All Officials, Agents and Employees of the Wabash Railroad Company in the State of Missouri: Your attention is called to the proposed fourth and fifth amendments to the constitution of the State of Missouri, relating to the Louisiana Purchase Centennial Exposition which it is intended to be held in the City of St. Louis in the year 1903. Amendment No. 4 authorizes the City of St. Louis to issue $5,000,000 in city bonds in aid of the fair. This can in no way affect state taxes. Amendment No. 5 authorizes the Legislature of the State of Missouri to appropriate from the sinking fund a sum not exceeding $1,000,000 for a state exhibit. This appropriation will come out of the current revenue and will not increase taxation. Unless both amendments No. 4 and No. 5 are carried there will be no World's Fair held in St. Louis in 1903. The Wabash Company has subscribed directly to the World's Fair fund the sum of $75,000 and, in common with all other railroad companies interested in St. Louis, is desirous of having the World's Fair project go through. . . . I therefore urge all officials and employees of the Wabash Railroad to not only cast their own votes in favor of the proposed amendments, but also to do all that they can to secure other votes."

A subscription of $85,000 is announced from the Missouri Pacific R. R. Vice-President C. G. Warner is a member of the Transportation Committee. Julius S. Walsh is Chairman of the Transportation Committee, and expects to secure subscriptions from the other railroads in Missouri without delay.

British Board of Trade Inspectors.

Major Druitt, R. E., has been appointed by the Board of Trade to be one of their inspectors. This is a new appointment, necessitated by the Prevention of Accidents to Railway Servants Act. It is understood that Lieutenant-Colonel H. A. Yorke, R. E., the senior railroad inspector, is to hold a higher position that did the late Colonel Marindin. He will be always at home, and his official title will be Inspector General of Railways.

Twin Screw Ferryboats for the New Jersey Central.

The Harlan & Hollingsworth Co. has a contract from the Central Railroad of New Jersey for building two steel twin screw ferryboats.

Naval Appropriations for Next Year.

Secretary Long, of the Navy Department, in his estimate of money needed for the maintenance and increase of the Navy, asks for the fiscal year beginning July 1 a total of $87,172,630, an increase over last year of $3,000,000.

The following are part of the estimates for work at the New York Navy Yard in Brooklyn: Reconstructing building No. 1 for boat house (to cost $185,000), $85,000; paving and grading, to continue, $40,000; granite and concrete dry dock (to cost $1,000,000), $500,000; fire protection system (to cost $162,000), $60,000; dredging, $25,000; barracks for enlisted men (to cost $300,000), $100,000; coal storage and coal handling plant, $100,000; extending building No. 33, $45,000; new roof for building No. 28, $15,000; railroad system extension, $25,000; piers on cob dock, $88,000; ordnance store house on cob dock, $90.000; slip for ordnance cob dock, $50,000; reconstructing building No. 19 (to cost $185,000), $100,000; locomotive and car house, $30,000; quay wall, cob dock extension, $75,000; extended building No. 116, $15,000.

Bonds for New York City Improvements.

The following is a partial list of the bonds, for which provision is made in the New York City budget, to be issued during the year:

Docks and ferries	$3,000,000
New aqueduct	1,000,000
Additional water supply	750,000
Laying water mains	313,000
Newtown Creek Bridge at Vernon avenue	644,495
Willis avenue bridge approaches	317,984
Third avenue bridge, south approach	556,400
Hall of Records construction	2,250,000
New East River Bridge	4,000,000
Repaving in all boroughs	2,000,000
Brooklyn water mains	815,000
Miscellaneous, including additional water supply for all boroughs, new bridges over East River and new public buildings, including schools	9,500,000

New Ships for the Atlantic Transport Co.

The Maryland Steel Co. is laying the keels of two large steel passenger and freight steamers for the Atlantic Transport Co., for service between New York and London. They will cost about $1,500,000 each, and will be ready for service next spring. The steamers will be duplicates of the Minneapolis and Minnehaha owned by the same company. Accommodations will be provided for 165 first-class passengers.

Electric Working in Italy.

The Adriatic Company, which works the lines on the eastern side of the Italian peninsula, has decided to work by electricity two branches of the main line down the coast to Brindisi. These branches extend from the main line towards the interior, where the Appenines furnish water power, which the company has already secured. They are from San Benedeth west to Ascoli, 21 miles, and from Giulanova west to Teramo, 16 miles. The tendency towards electricity in Italy may be explained by the fact that that country has no coal, and in the mountains there is often water power not utilized.

A Transporting Pageant.

In order to close the Paris World's Fair in a blaze of glory, it was purposed to form a procession of all the vehicles exhibited in the Desaix gallery, illustrating modes of travel throughout the ages—ancient Greek and Roman chariots, Gallic carts, cars, carriages, post-chaises, litters, cabs, droskies, etc., and lest the spectator's eyes should wander from these strange vehicles, their seats are to be occupied by ballet dancers and other pretty women dressed in costumes of the times appropriate to the respective carriages.

Railroad Extension in Finland.

During the period from 1901 to 1904 the following railroad lines will be built in Finland: Idensalm to Kajani, at a cost of 5,400,000 Finnish marks; Oestermyra to Kristinestad, at a cost of 9,900,00 Finnish marks; the latter line will be 114 kilometers in length. Further on a line from Kronoborg to Nyslott, 98 kilometers in length, at a cost of 10,764,000 Finnish marks, and another line from Värtsilä via Pielisjärvi to Nurmes, 205 kilometers in length, at a cost of about 16,000,000 Finnish marks. It is reported that the Finnish Government is about to place a 4 per cent. loan of 35,000,000 Finnish marks abroad in order to meet the expenditure necessitated for the construction of the above mentioned new lines. The various amounts given above represent only the cost of constructing the lines, but do not include any rolling stock. The Finnish mark equals 20 cents American currency.

The French Soudan Railroad.

The report to the French Senate on the Budget of 1900 contains information as to the progress of the railroad in the French Soudan, from which the subjoined particulars have been extracted: The line was working on January 1, 1900, up to 136 miles. In the present year 19 miles are to be built, as well as a bridge over the Bakoy at Toukoto, which will be 350 meters long. From next year the construction will progress at the rate of 50 miles annually; so that, at the end of 1904, the line will reach Koulikoro, a point situated on the navigable portion of the Niger, about 355 miles from Kayes. The cost of the line is fixed at $23,000 per mile. The income is derived from: (1) Traffic receipts $100,000 round figures, for the year 1899; (2) a State subvention for the maintenance of the engineer staff ($33,600 annually); (3) a subvention of $100,000 annually for twenty-four years from 1899 paid by the State; (4) a similar subvention paid by the colonies. It is anticipated that the revenue of the line will amount to 2,800 f. per kilometer in 1900; but more than half of this sum is derived from transport on account of the State or the Colonial Government, and the actual traffic receipts are not more than from 1,200 f. to 1,300 f. per kilometer.

LOCOMOTIVE BUILDING.

The St. Louis Southwestern is considering buying a few new locomotives.

The McCloud River is having two engines built by the Baldwin Locomotive Works.

The Danish State Railroads are reported as intending to buy, in 1901, a number of locomotives.

The Wheeling & Lake Erie, it is stated, will order five locomotives. We have no official information.

The Michigan Central is having a number of engines built by the Schenectady Locomotive Works. They are being turned out at the rate of about six a month.

The Chesapeake & Ohio has ordered three eight-wheel engines from the Schenectady Locomotive Works and one 10-wheel engine from the Baldwin Locomotive Works.

The Turkish Government, according to the Minister of Turkey at Washington, has received bids from certain American locomotive builders on a number of locomotives.

CAR BUILDING.

The Pullman Co. is building 10 cars for its general service.

The Lehigh Valley has ordered 82 cars from the Pressed Steel Car Co.

The New York, Ontario & Western is asking bids on 500 coal cars.

Swift & Co. are reported in the market for about 200 refrigerator cars.

The Baltimore & Ohio has ordered 32 passenger cars from the Pullman Co.

F. M. Pease has ordered 50 tank cars from the Illinois Car & Equipment Co.

The Pittsburgh, Shawmut & Northern is reported in the market for 500 freight cars.

The New York, Chicago & St. Louis is in the market for 500 flat and 15 passenger cars.

The Lake Shore & Michigan Southern is in the market for a large number of passenger cars.

The Ohio River & Lake Erie is receiving bids on some coal cars; about 100 will be ordered.

The Missouri Pacific has ordered 500 furniture cars from the American Car & Foundry Co.

The Arizona & New Mexico has ordered two cabooses from the American Car & Foundry Co.

The Pittsburgh, Bessemer & Lake Erie has ordered 2,000 steel coal cars from the Pressed Steel Car Co.

The Robert Portner Brewing Co., Alexandria, Va., has placed an order with the Allison Mfg. Co. for five cars.

The St. Louis, Peoria & Eastern has ordered six dump cars, of 80,000 lbs. capacity, from the American Car & Foundry Co.

The Chicago, Rock Island & Pacific is reported to have ordered 10 passenger and three dining cars from the Pullman Company.

The Chicago, Burlington & Quincy is reported to have ordered 20 passenger and five dining cars from the Pullman Company.

The Cleveland, Cincinnati, Chicago & St. Louis is reported to have ordered 50 passenger cars from the Barney & Smith Car Co.

The Central of New Jersey has ordered 1,000 steel cars from the Pressed Steel Car Co. and 500 box cars from the Haskell & Barker Car Co.

The United Fruit Company, New York City, has ordered 40 cars, for carrying bananas in Costa Rica, from the American Car & Foundry Co.

The Pittsburgh & Buffalo Coal Co. has ordered 100 hopper bottom gondola cars of 80,000 lbs. capacity from the Illinois Car & Equipment Co.

The Chicago & North Western has placed an order with the Pullman Company for 20 passenger coaches, and 5 combination and 6 miscellaneous cars.

The Canadian Pacific is reported to have placed orders with its Perth (Ont.) shops for 138 box, 100 hopper-bottom gondola, 20 refrigerator and 100 ore cars, all of 60,000 lbs. capacity.

The Illinois Central has not ordered 500 sand cars from the Illinois Car & Equipment Co., as stated last week. The road is now reported to have ordered 500 box cars from the Haskell & Barker Car Co. We have no official information.

The Pennsylvania, in addition to the 1,700 cars referred to last week, has ordered 500 gondola cars of 80,000-lbs. capacity from the Allison Mfg. Co., 200 more box cars of 80,000-lbs. capacity from the Illinois Car & Equipment Co., and 3,000 pressed steel hopper-bottom coal cars of 100,000-lbs. capacity from the Pressed Steel Car Co., making in all 5,400 cars. The road will also order 1,000 flat cars.

The Erie is having three baggage cars built by the Pullman Co. They will be 65 ft. long inside, 9 ft. 8 in. wide outside of sills, 9 ft. 1 in. high from top of sill to roof boards at center of car, and will have wood underframes. They will be equipped with open hearth steel axles, double iron bolsters, Westinghouse brakes, National hollow brake-beams, Buhoup three-stem couplers, Standard Coupler Co.'s draft rigging, Standard short blind-end steel platforms and French springs.

The Kansas City, Fort Scott & Memphis, as noted in our issue of Nov. 2, has ordered some coal cars. These will be of 60,000 lbs. capacity, will weigh about 29,000 lbs., will be 34 ft. long, 8 ft. wide, 45 ft. high, of wood with metal underframes. They will be equipped with iron axles, Shickle, Harrison & Howard bolsters, Sterlingworth brake-beams, Westinghouse brakes, Chicago couplers, Miner draft rigging, Chas. Scott Spring Co.'s springs and Shickle, Harrison & Howard trucks.

The Intercolonial, as noted in our issue of Nov. 9, has ordered 1,275 box cars and 150 flat cars. The box cars will be of 60,000 lbs. capacity, 35 ft. long, with wood underframes; they will be equipped with Simplex trucks and body bolsters with roller bearings, National hollow brake-beams, Westinghouse brakes, Detroit couplers and Chicago-Cleveland roofs. The flat cars will be of 60,000 lbs. capacity, 35 ft. long, with wood underframes. The special equipment, with the exception of the roofs, mentioned above, will be used on these cars also.

The Atlanta & West Point, as stated Oct. 26, ordered 100 box, 25 coal and 25 flat cars from the Mount Vernon Car Mfg. Co. Last week we gave some of the specifications for the box cars. The coal cars will measure 36 ft. long, 8 ft. 6 in. wide and 7 ft. 9 in. high. The flat cars will measure 36 ft. long, 8 ft. 9 in. wide and 4 ft. 5 in. high. All will have a capacity for 60,000 lbs.; the former will weigh 30,000 lbs. and the latter 26,000 lbs. The specifications call for Shickle, Harrison & Howard steel bolsters, National hollow brake-beams, Westinghouse brakes, Ajax brasses, Standard couplers and French springs. The flat cars will have arch bar trucks with Shickle, Harrison & Howard steel bolsters.

The Cincinnati, Hamilton & Dayton orders, noted last week, have been increased as indicated at that time. As matters stand now the American Car & Foundry Co. has an order for 400 wooden box cars of 70,000 lbs. capacity, 36 ft. 3½ in. long and 8 ft. 4¾ in. wide (inside); the distance between the sills and plates is 7 ft. 8 in. Barney & Smith have an order for 400 wooden coal cars of 70,000 lbs. capacity of the same length and width as the box cars, and with sides 45 in. high. All these cars are for December delivery and will have iron body bolsters with wooden truck bolsters, Sterlingworth brake-beams, Westinghouse air-brakes. American couplers, Butler draft rigging, pressed steel journal box lids and Detroit springs. The box cars will have Dunham doors, Chicago roofs and Hewitt journal brasses.

BRIDGE BUILDING.

Aberdeen, Wash.—The County Commissioners want bids until Jan. 7, 1901, for a combination highway bridge over Chehalis River, near Garrard Creek, according to report. The main span of the bridge will be 210 ft. long. There will be about one mile of approach.

Andover, N. B.—We are informed that the bridge proposed over the St. Johns River between this place and Perth to replace the old wooden structure, will be 1,200 ft. long. Specifications are being prepared.

Atlantic City, N. J.—The Bridge Committee of the County Board of Freeholders will soon receive bids for the superstructure of a bridge to be built at Albany avenue, at a probable cost of $16,000, which will be paid for jointly by the Chelsea Heights Improvement Co. and the county.

Bangor, Me.—City Engineer F. L. Marston has made plans and specifications for the proposed steel bridge across the Kenduskeag River at Franklin street. The superstructure will consist of two steel girders, one 45 ft. long and the other 54 ft. The roadway will be 24 ft. wide, and there will be two sidewalks each 7 ft. 6 in. wide.

Bridgeport, Conn.—Glenn M. Scofield, 21 Park Row, New York, informs us that nothing definite has been decided regarding the plans for the proposed new bridge over Yellow Mill Pond, Bridgeport. The State Legislature will have to amend the act this session before work can be begun.

Calvert, Tex.—At a recent meeting of the business men of Calvert it was decided to build a pontoon bridge across the Brazos River until an iron bridge can be built.

Cincinnati, Ohio.—The County Commissioners have been petitioned for a bridge over Mill Creek in Sycamore Township to connect Davis street in Lockland, with Clark street, in Reading. The Engineer is ordered to make plans and estimates.

Cleveland, Ohio.—Reports state that the lowest bid received for the substructure of the Middle Seneca street rolling lift bridge was $55,000 by the Standard Contracting Co. (Nov. 2, p. 730.)

De Queen, Ark.—We are informed that the bridge proposed over the Cassatot River at this place, four miles east of Lockesburg, will be a steel structure 200 ft. long. Address Judge G. A. Bell or G. A. Vaugh, at Lockesburg.

Detroit, Mich.—The Committee of Supervisors on Roads and Bridges has reported in favor of building a steel drawbridge over the River Rouge at Dix road, replacing the present old pontoon bridge. The new bridge will cost $20,000.

Duluth, Minn.—We are informed that contracts will probably be let during this winter, by the Northern Pacific, for the viaduct to be built over Garfield avenue for the interested railroads. The plans as altered provide for a plate girder structure about 1,200 ft. long, to cost about $99,000.

The contract for the foot bridge proposed over the railroad track at Tenth street, West, by the same railroads, will also probably be let this winter. It will be about 500 ft. long and consist of four plate girder spans. Address the Northern Pacific Ry.

Galveston, Tex.—A report from San Francisco says it is announced from the general office of the Southern Pacific that arrangements have been made whereby the three railroads entering Galveston will share the expense of building a substantial bridge across Galveston Bay, high enough and strong enough to resist any flood.

Hackensack, N. J.—The contract is let to F. R. Long Co., of New York, to build the new county bridge over the Hackensack River on the Paterson Plank Road near Secaucus, at $234,000.

Kamloops, B. C.—W. S. Gore, Deputy Commissioner of Lands & Works Department, Victoria, B. C., we are informed, is receiving bids, until Nov. 20, for the proposed bridge over the Thomson River at Kamloops. It will be 915 ft. long.

Minneapolis, Minn.—A resolution is before the Council asking for a bond issue of $150,000 for a bridge across the river at Thirty-second avenue, North.

New Lewisville, Ark.—The contract has been let to the Missouri Valley Bridge Co. for the renewal of the 300-ft. steel draw span bridge over the Red River west of this place for the St. Louis Southwestern Ry. (Nov. 9, p. 747.)

New Westminster, B. C.—A new bridge will be built at this place by the Dominion Government.

New York, N. Y.—The Board of Aldermen has passed an ordinance authorizing an issue of bonds for the Blackwell's Island bridge over the East River between the Boroughs of Manhattan and Queens.

Louis A. Risse, Chief Engineer of the Board of Public Improvements, has submitted to that Board a report recommending abolishing the grade crossing at East 233d street, by a viaduct from the Bronx River over the New York & Harlem R. R. to Second street.

The Board of Public Improvements has passed a resolution authorizing approaches be built to the Willis avenue bridge over the Harlem River at an estimated cost of $474,000. The northern approach from the Southern Boulevard is expected to cost $301,288, exclusive of the cost of land; the southern approach, from Second avenue, $172,618.

Passaic, N. J.—At a meeting of the Board of Freeholders last week estimates were submitted for a bridge over the Passaic River at Passaic Falls. It will be about 1,060 ft. long and will cost $100,000 if built of concrete and modeled after the West street bridge.

Perth Amboy, N. J.—The New York & Long Branch R. R. Co. will replace its drawbridge over the Raritan River with a double track steel structure. The bridge is used jointly by the Pennsylvania and the New Jersey Central Railroads.

Philadelphia, Pa.—The newspaper report that the Pennsylvania R. R. will build a stone bridge across the Schuylkill River at a cost of $800,000 is officially denied by the Engineer of that Company.

Pittsburgh, Pa.—The new Southern Traction Co., John Daly, Superintendent, will raise the White bridge, crossing from McKees Rocks to the upper end of Neville Island, and will extend the approaches about 110 ft., making an overhead crossing of the Pittsburgh & Lake Erie.

Port Chester, N. Y.—The Port Chester Electric Ry. will extend its line to East Port Chester and will build a bridge over the Byram River.

Reading, Pa.—The Philadelphia & Reading Ry. has contracted with the Pencoyd and the Phoenix Bridge Companies for bridges on the Reading Belt Line. The Pencoyd Iron Works contracted to build bridges at Milmont Crossing, Shappo's dam crossing, Tulpehocken Creek, the Lancaster pike, Oakland avenue in West Reading and at Farm lane and the public road, the award amounting to about $775,000. The Pencoyd Co. will also build two bridges across the Schuylkill River. The bridge to be called the Lower Schuylkill Crossing will be 860 ft. long, and will have five spans. The upper Schuylkill River bridge will be a steel viaduct with five spans, and will be 900 ft. long. The Phoenix Co. secured the contract to build the West Reading viaduct at a cost of $195,000. It will have 24 spans and be 950 ft. long.

Sioux Falls, S. Dak.—The County Commissioners and the city are arranging to build a bridge over the Big Sioux River at a cost of about $15,000. It will probably be of two spans.

South Bend, Wash.—The County Commissioners have ordered a bridge built over North Nema River, also over Salmon Creek.

Spokane, Wash.—See Other Structures.

Stockton, Cal.—The time is reported extended for receiving bids for the proposed bridge at Dunham's Ferry over the San Joaquin, from Dec. 4 to Dec. 22. The draw will be 257 ft. long and there will be two spans of 70 ft. each. F. E. Quail, County Engineer, Stockton, Cal. (See Tracy, Cal., Oct. 26, p. 710.)

Vicksburg, Miss.—Two iron bridges will be built on a new road in the National Military Park at Vicksburg. Address Capt. W. T. Rigby, Corps of Engineers, U. S. A., Commissioner.

Washington, D. C.—Sealed proposals are wanted at the office of the District Commissioners, until Saturday, Dec. 1, for building the foundations for a masonry bridge across Rock Creek on the line of Connecticut avenue extended. Lansing H. Beach, Commissioner.

Woodsdale, Ohio.—L. A. Dillon, County Engineer, estimates that the cost of repairs to the wooden bridge over Miami River will be over $12,000. A new steel structure is estimated to cost $50,000. The work will probably be done in the spring.

Other Structures.

Albuquerque, N. Mex.—The Atchison, Topeka & Santa Fe will soon begin work on a passenger and freight station, 150 x 60 ft. and two stories high, in Albuquerque. An arcade about 200 ft. long will connect the station with an hotel, also to be built by the railroad. The two buildings will cost about $125,000.

Amherst, Wis.—The Wisconsin Central and the Green Bay & Western railroads will build a union depot at Amherst Junction replacing the structure burned some time ago.

Boston, Mass.—The Boston & Maine is making plans for a storehouse to be built at the Mystic terminals. The building will be two stories high, 850 ft. long and 160 ft. wide.

Cedar Rapids, Iowa.—Local reports state that Vice-President Harahan, of the Illinois Central, has announced that the company will spend $200,000 in Cedar Rapids in building new freight and passenger stations.

Eddystone, Pa.—The Frankford Steel & Forge Co., of Pittsburgh, is having plans made for a plant at Eddystone, Delaware County, to which it will remove. The buildings include a machine shop 70 x 202 ft., one story high, of brick and steel construction. A power-house and office building will also be built.

Greenwood, B. C.—The Canadian Pacific Ry. is contemplating building a coaling station at Eholt near Greenwood.

Monterey, Mex.—Some of the contracts for building and equipping the blast furnace and building the foundry and machine shop for the new steel plant in Monterey, have been let, as follows: William B. Pollock Co., of Youngstown, Ohio, the contract for building the blast furnace which will have an 18-ft. bosh and a stack 80 ft. high; also to build the four hot blast stoves, to be 75 ft. high and 19½ ft. in diam. The furnace will have a daily capacity of 400 tons. The pair of compound condensing blowing engines will be furnished by William Tod & Co., also of Youngstown, Ohio. The Babcock & Wilcox Co. will furnish the 2,500-h.p. boilers. The foundry outfit will be installed by the Whiting Foundry Equipment Co., of Harvey, Ill. The Niles Tool Co. will furnish the machine shop equipment, and the General Electric Co. the electrical machinery. Five cranes, ranging from 15 to 30 tons, will be installed by the Niles-Bement-Pond Co. Contracts are yet to be let for five open-hearth furnaces, three of which will have a capacity of 35 tons. The other two will be of 50 tons capacity. Contracts for the mill equipment have not been let.

Norfolk, Va.—The car sheds and electric plant of the Norfolk Railway & Electric Co., in Huntersville, a suburb of Norfolk, were totally destroyed by fire Nov. 11. Fifty-two cars and the electrical machinery were destroyed, causing an estimated loss of about $150,000.

Philadelphia, Pa.—The Pennsylvania R. R., according to report, is preparing plans for rebuilding the portion of the abattoir recently destroyed by fire. The new buildings will be as near fire-proof as can be made.

Admiral Melville, Chief of the Engineering Bureau of the Navy, has on exhibition in his office at Washington, plans for the steam engineering shops proposed for the League Island Navy Yard.

Pittsburgh, Pa.—The American Bridge Co. has plans made for finishing the large bridge and structural plant which was begun by the Berlin Iron Bridge Co. in Pittsburgh several months ago, but which was stopped when that company was absorbed by the American Bridge Co. The works are to cover a tract of 40 acres, with a river frontage of one-half mile. The plans call for a series of 12 buildings, each about 50 ft. wide and 800 ft. to 1,000 ft. long. These will be arranged for a continuous system of manufacture.

Quincy, Ill.—The Electric Wheel Co. contemplates building a new plant. The building will be one-story high and have about 45,000 sq. ft. of floor space.

San Francisco, Cal.—Bids are wanted by the State Board of Harbor Commissioners, until Nov. 27, according to report, for building two car ferry slips and four wharves. Wm. D. English, Secretary.

Seattle, Wash.—The Northern Pacific and the Great Northern railroads are reported to have agreed to build a union passenger station in Seattle and to establish freight yards.

Spokane, Wash.—Plans have been made by the Great Northern for the new passenger station to be built on Havermale Island between Washington and Howard streets. The new station will be of brick and marble, with a tower 140 ft. high, and will be 350 ft. long, 50 ft. wide and two stories high. The plans were made by Messrs. Frost & Granger, of Chicago, Ill. Bridges will be built to reach the station. A report says that bids are asked.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xi.)

Naval Architects and Marine Engineers.

The members of this society have been invited to visit the shipyard of William Cramp & Sons, at Philadelphia, on Saturday, Nov. 17. Transportation will be provided both ways.

Canadian Society of Civil Engineers.

An ordinary meeting was held on Thursday, Nov. 8, at 8 o'clock, p. m., when a paper on "The Miners' Inch and the Discharge of Water Through Various Orifices Under Low Heads," by Mr. Thomas Drummond, was read.

New England Railroad Club.

The regular monthly meeting of the Club was held at Pierce Hall, Copley Square, Boston, Tuesday, Nov. 13, at 8 p. m. A paper was presented by Mr. J. H. French, Superintendent Plymouth Division N. Y., N. H. & H. R. R., entitled "Railroad Reminiscences."

Western Railway Club.

A meeting of the Western Railway Club will be held Tuesday afternoon, Nov. 20, at the Auditorium Hotel, Chicago. Mr. E. E. Russell Tratman will present a paper "Railroad Yards and Terminals," and Mr. R. P. C. Sanderson, Assistant Superintendent of Machinery, Atchison, Topeka & Santa Fe, will read a paper entitled, "The Drop Test as a Means of Showing the Relative Strength of Draft Gear."

North-West Railway Club.

A meeting of the club was held on Wednesday evening, Nov. 14, at the Ryan Hotel, St. Paul. Mr. C. C. Jett, Instructor in Mechanical Engineering at the University of Minnesota, presented an illustrated paper on "The Use

of the Stereopticon in Teaching Railroad Signaling." The subjects for discussion were: Mr. Zachritz's paper on "Repairs to Private Line Cars"; "Wear of Locomotive Driving Wheel Tires," (continued); "Utilization of Air Pump Exhaust for Heating Feed Water on Locomotives."

Civil Engineers' Society of St. Paul.

A regular meeting of the Civil Engineers' Society of St. Paul was held at 8:30 p. m., Nov. 5; present, 10 members and six visitors. President Powell in the chair. A rather informal and indefinite verbal proposition from the Commercial Club, touching the appointment of committees by that body and this society to confer on the advisability of closer relations between the two was referred to the government of the society for more definite development. Mr. Oliver Crosby read a paper on "The Manufacture of Steel Castings by the Tropenas Process." He made special reference to the plant of the American Hoist & Derrick Co., and exhibited some striking and curious specimens of the steel, together with drawings, tables, etc.

American Society of Mechanical Engineers.

The regular ticket for officers for the American Society of Mechanical Engineers as prepared by the Nominating Committee is announced as follows: For President, Samuel T. Wellman, of Cleveland, O. For three Vice-Presidents, Arthur M. Waitt, New York; James M. Dodge, Philadelphia, and Ambrose Swasey, Cleveland. For three managers, W. F. M. Goss, Purdue University, Lafayette, Ind.; DeCourcy May, Scranton, Pa., and D. S. Jacobus, Stevens Institute, Hoboken. For Treasurer, William H. Wiley, New York, and for Secretary, F. R. Hutton, New York, both now serving. The reader will observe that although Mr. Waitt has not been nominated for the presidency he is nominated for Vice-President and so put in line of promotion, and, as we remarked two or three weeks ago, there are other years coming. It will also be observed that the railroads are represented by Prof. Goss, who is now about 50 per cent. a railroad man.

The Engineers' Club of Philadelphia.

At the meeting of the club, to be held on Saturday of this week, the paper will be, "Pennsylvania Forests and What is Necessary to Their Restoration." By Dr. J. T. Rothrock, Commissioner of Forestry.

At the meeting held Nov. 3, Mr. James Christie opened a topical discussion on American Isthmian Canals, and confined his remarks chiefly to a description of the engineering features of the Nicaragua and Panama routes. By the aid of the electric lantern, maps were shown illustrating the shortening of steamship routes that would be effected by an isthmian canal, as well as the directions and cross sections of the several routes proposed.

Mr. Edwin F. Smith presented a written discussion, which was read by the Secretary. He pointed out the fact that the Lake Nicaragua route is the shortest practicable one to connect the Atlantic and Pacific seaports of the United States, and will prove the best one if the works can be made safe against climatic conditions. The changes which the present commission has made in the earlier plans of Childs and Menocal were pointed out and criticised, and the desirability of the United States becoming the owners of the Nicaragua Canal was emphasized.

Mr. L. Y. Schermerhorn briefly described the different routes, especially for the purpose of calling attention to the advantages of other routes in comparison to that through Lake Nicaragua.

PERSONAL.

(For other personal mention see Elections and Appointments.)

—Right Honorable C. T. Ritchie, for several years President of the British Board of Trade, is now Secretary of State for Home Affairs, having been appointed to this office on the reorganization of the cabinet, following the recent parliamentary elections; and he is succeeded as President of the Board of Trade by Right Honorable Gerald William Balfour, hitherto Chief Secretary for Ireland.

—Mr. John Hodge, Master Car Builder of the Atchison, Topeka & Santa Fe, died recently at Chicago. He was born at Ogdensburg, N. Y., and entered the service of the Missouri Pacific as Master Car Builder in 1870. Later he became Superintendent of the St. Charles Car Works and in 1887, became Master Car Builder of the Chicago, Santa Fe & California, and in August of the same year took a similar position with the Atchison.

—Mr. J. V. Slusser, who had been in the service of the Louisville & Nashville for about 30 years, died Nov. 3, after an illness of several weeks. Mr. Slusser was born Aug. 20, 1840, at York, Pa., and entered the railroad service in 1857 as foreman of the Northern Central, later becoming Engineer same road. In February, 1870, he became Engineer, two years after roundhouse foreman, and in 1881 Master Mechanic at Memphis, Tenn., of the Louisville & Nashville, which position he held at the time of his death.

—Mr. Elbridge S. Tompkins, heretofore Secretary of the St. Louis Traffic Bureau, has been unanimously chosen Commissioner in place of Mr. C. A. Parker. Mr. Parker, who has been Commissioner of the Bureau since the death of Mr. Vanlandingham, last January, has resigned to go to Colorado, as announced in the *Railroad Gazette* last week. Mr. Tompkins is 32 years old. He was in the service of the Atchison, Topeka & Santa Fe about 14 years, beginning in 1883. He came to St. Louis as chief clerk of the Traffic Bureau in 1897.

—Mr. Miles Bronson becomes Superintendent of the Harlem Division of the New York Central & Hudson River. He was born May 8, 1875, and entered railroad service as a clerk in the Law Department of the Grand Trunk at Detroit, Mich., in June, 1890. On May 30, five years later, he was appointed Secretary to the President of the New York, Chicago & St. Louis, and took a similar position with the parent company, the New York Central, in April, 1898. Later he was made Assistant to the President of the same company. His appointment as Superintendent took effect Nov. 1.

—After twenty-five years of continuous service with the Chicago, Milwaukee & St. Paul Mr. C. N. Souther becomes General Agent of the Passenger Department. Mr. Souther was born in Wisconsin in 1857. His first railroad experience was running as night messenger in the old yards at Milwaukee. He served for a number of years as night operator at different stations, principally on the Chicago Division. For two years he was station agent at Morton Grove, Ill., and then operator in the city freight and passenger office at Chicago. He became Assistant to the City Ticket Agent under Mr. W. C. Applegate, and in 1887, City Ticket Agent, the position held up to Nov. 1 last.

—Mr. Francis J. Cole, lately Mechanical Engineer of the Rogers Locomotive Company, and before that Mechanical Engineer with the Baltimore & Ohio, has entered the service of the Schenectady Locomotive Works as Assistant Mechanical Engineer. Mr. Cole served four years as apprentice in the machine shop and afterwards as draughtsman with the Northern Central Division of the Pennsylvania Railroad. He was then two years Chief Draughtsman of the Trans-Ohio Division of the Baltimore & Ohio, two years with the West Shore under Mr. Soule and 10 years with the Baltimore & Ohio as Chief Draughtsman of the car and locomotive departments and as Mechanical Engineer. He has been about five years with the Rogers Locomotive Company.

—Mr. Thomas M. Schumacher, General Agent of the Union Pacific at San Francisco, Cal., was born Feb. 16, 1861, at Williamsport, Pa. He entered railroad service in 1879 as telegraph operator on the Atlantic & Great Western, and served chiefly in various clerical capacities with the Cleveland, Columbus, Cincinnati & Indianapolis, the Pittsburgh, Cincinnati & St. Louis, the Chicago, Burlington & Quincy, and the Missouri Pacific until 1891, when he became chief clerk in the General Agent's office of his present company at St. Louis. Three years later he was made chief clerk in the general freight office at Omaha, and in 1898 General Agent at San Francisco. From Oct. 1, 1898, to Nov. 1, 1900, he was Vice-president and General Manager of the Continental Fruit Express and returned to the Union Pacific on Nov. 1.

—Mr. G. W. Talbot became Traffic Manager of the Peoria & Pekin Terminal at Peoria, Ill., on November 1. He was born at Centreville, Mich., August 12, 1873. He was educated in the public schools of Des Moines, and at the College of Emporia, Kan., and in 1891 began railroad service as messenger boy on the Chicago, Burlington & Quincy at Des Moines. He was clerk in the city ticket office until the fall of 1892, then clerk and assistant cashier of the Des Moines Union until August, 1894, when he became ticket agent of the Union Depot at Des Moines. He was Traveling Freight and Passenger Agent of the Des Moines Northern & Western and of the Chicago, Milwaukee & St. Paul until September, 1898, and held a similar office with the Iowa Central until November 1, the date of his appointment as Traffic Manager of the Peoria & Pekin Terminal.

—Mr. Joseph H. Sands, as already noted, became General Superintendent of the Eastern District of the Southern Ry. on Nov. 1, under the reorganization of the Operating Department. Mr. Sands was born at Washington, D. C., Jan. 1, 1851. He entered railroad service in March, 1874, as clerk to the Superintendent of Transportation of the Pennsylvania at Altoona, Pa., and served from Jan. 21, 1877, as Trainmaster of the same road at the Altoona yard. From November, 1879, to June 1, 1883, he was Superintendent of the Shenandoah Valley road, and then until March 1, 1885, General Superintendent of the Norfolk & Western, of which he became General Manager on Nov. 1 of the same year. He was made General Manager of the South Carolina & Georgia April 15, 1897, in which position he continued until April 30, two years following, when he became Superintendent of the Charleston Division of the Southern, his present company. He occupied that position at the time of his recent advancement.

—Mr. John A. Dodson, on Nov. 1, became General Superintendent of the Western District of the Southern Ry., the position corresponding to that of Mr. J. H. Sands on the Eastern District, to which reference is made above. Mr. Dodson was born in Guilford County, N. C., Aug. 20, 1851, and entered railroad service in 1871, since which time he has served consecutively as freight brakeman, freight and passenger conductor of the North Carolina R. R. to April, 1888; track supervisor of the Richmond & Danville to October of the same year, and Roadmaster of the Georgia, Carolina & Northern to 1891. He was Superintendent of Transportation and Construction of the latter road to July 1, 1892, and Division Superintendent of the Charlotte, Columbia & Augusta and the Greenville divisions of the Richmond & Danville to Sept. 1, 1894. Until April 20, 1895, he was Superintendent of the Atlanta & Charlotte division of the same line. He was then made General Roadmaster of the Eastern System of his present company, the Southern, which position he held until July 1, 1899, when he was made Superintendent of Transportation of the entire system and continued in that position until Nov. 1 last.

—Mr. Frederick W. Bond, as recently noted, is the Chief Engineer of the St. Louis & San Francisco. Mr. Bond was born April 14, 1852. He took a special course at Antioch College in 1868 and 1869, and entered railroad service the following year with the St. Louis, Council Bluffs & Omaha as rodman. He served until 1872 with the Union Pacific and the Southern Pacific as rodman and levelman. He was topographer of the United States survey of the Yellowstone Park in 1873, and continued in the United States service as Engineer in the Department of the Platte, in 1874, and in the Indian service during the two years following. After several years of general practice, he became Resident Engineer of his present company, the St. Louis & San Francisco, in 1880. He was made Chief Engineer of the Kansas City, Nevada & Fort Smith in 1889, and accepted a similar position with the Kansas & Texas Coal Co. in 1891. Prior to his recent appointment he was Chief Engineer of the Fort Smith & Western, which position he held since 1896.

—Mr. Leverett S. Miller, on Nov. 1, became Assistant to the President of the Erie. Mr. Miller was born at New York, May 23, 1863, and was educated at the Rensselaer Polytechnic Institute at Troy. He entered railroad service in 1885 as Assistant Engineer of the Denver, Utah & Pacific. In 1886 and 1887 he was Assistant Engineer of the Colorado R. R. Co., part of the Chicago, Burlington & Quincy, and during the latter part of 1887 Chief Engineer of the Eastern Alabama. He was engaged as Assistant Engineer of Construction on the Thames River Bridge at New London, Conn., to November, 1889, when he was made Assistant Engineer of the New York, Providence & Boston, and advanced to Assistant Superintendent of the same road in February of the following year. From October, 1890, he was Chief Engineer of the St. Paul & Duluth, and two months later was given the added duties of Assistant General Manager. He resigned that office in February, 1898, to accept the position of General Manager of the Seattle & International, from which position he enters the service of the Erie.

—Mr. J. S. B. Thompson is the new General Agent of the Southern Ry. at Atlanta, Ga. He was born June 10, 1858, in Culpepper County, Va., and entered railroad service July 15, 1878, at Alexandria, Va., as clerk in the office of the General Superintendent of the Virginia Midland, now part of the Southern. With the exception of a few months in 1879 spent as clerk in the office of the Auditor of Freight and Passenger Receipts of the Long Island R. R., he has been continuously with the Southern Ry. and companies now a part of that system. He was made Secretary to the President on the Virginia Midland July 3, 1883, and was later Assistant General Freight Agent of the Virginia Midland, Assistant General Freight and Passenger Agent of the Virginia Midland Division (Richmond & Danville), and, later the Washington & Ohio Division was added to his territory. He continued then until September 1, 1891, as Division Freight and Passenger Agent and as Superintendent. He was made Assistant to the General Manager of the Richmond & Danville, and then on October 1, 1892, Superintendent of the Richmond & Danville, the Virginia Midland and Washington & Ohio divisions of the Richmond & Danville system at Richmond, Va. When the Southern Ry. succeeded to the Richmond & Danville on July 1, 1894, he became Superintendent of the First Division, and on April 20 of the following year, Assistant General Superintendent of the entire system at Atlanta, Ga. His appointment as General Agent took effect November 1.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—J. S. Hobson, Switch and Signal Engineer, has resigned.

Chicago & Northwestern.—The headquarters of S. M. Braden, Division Superintendent, have been removed from Belle Plaine, Iowa, to Mason City, Iowa. E. A. Kellogg has been appointed Assistant Division Superintendent of the Iowa Division, with headquarters at Boone, Iowa, succeeding M. F. White, resigned.

Chicago, Burlington & Quincy.—At a meeting of the stockholders N. Thayer was elected a Director, succeeding the late J. N. A. Griswold.

Chicago, Rock Island & Pacific.—T. B. Dixey, Assistant Treasurer, has resigned.

Chicago, Rock Island & Texas (Chicago, Rock Island & Pacific).—H. A. Parker, First Vice-President and General Manager of the C., R. I. & P., has been elected President of the C., R. I. & T., succeeding M. A. Low, resigned.

Dansville & Mount Morris.—George E. Dunklee, heretofore General Freight and Passenger Agent, has been apointed General Superintendent, in charge of Traffic and Operation, with headquarters at Dansville, N. Y.

Eastern of Minnesota (G. N.)—Louis W. Hill, Vice-President, has been elected President, succeeding Samuel Hill.

El Paso, Pecos Valley & Eastern.—The officers of this company, referred to in the Construction column, are: President, J. J. Hagerman, Roswell, N. Mex.; Secretary, A. R. Teeple, Roswell, N. Mex.; Treasurer, Percy Hagerman, Colorado Springs, Colo.; Chief Engineer (probably), L. J. Caswell.

Marietta, Columbus & Cleveland.—The officers of this company, which recently acquired, by purchase, the Toledo & Ohio Central Extension R. R. (see News column this week) are: President, H. H. Isham; Vice-President and Treasurer, H. A. Clare; Secretary and General Manager, Robert H. England; General Counsel, F. A. Durban; Auditor, F. L. Alexander; and General Freight and Passenger Agent, H. C. Vincent. General Offices: Union Depot, Marietta, Ohio. Possession was taken Nov. 1. The Directors are: Mr. Isham, Mr. England and Mr. Durban; also J. W. Nye and W. W. Mills.

Mexican Central.—G. F. Hawks has been appointed Superintendent of the Mexico Division, succeeding C. B. Cox, assigned to other duties. C. O. Wheeler has been appointed Superintendent of the San Luis Division, succeeding Mr. Hawks.

Minneapolis, St. Paul & Sault Ste. Marie.—Fred W. Curtis, heretofore Assistant Superintendent, has been appointed Superintendent of the Wisconsin & Peninsular Division, with headquarters at Minneapolis, Minn., succeeding G. R. Huntington, promoted.

New York Central & Hudson River.—At a meeting of the Board of Directors, held Nov. 9, the following changes in the organization of the Company took effect: Chas. C. Clarke, on account of advancing years, resigned as Vice-President, after a valuable and extended service of over forty-six years. Edward V. W. Rossiter was appointed Vice-President, succeeding Mr. Clarke, and George S. Prince was appointed Treasurer, succeeding Mr. Rossiter. Edward L. Rossiter and William A. Greer have been appointed Assistant Treasurers. William M. Kinch has been appointed Superintendent of Signals, with headquarters at Grand Central Station, New York. Eugene M. Weaver has been appointed Assistant Superintendent of Signals of the Hudson, Putnam, and Harlem Division, succeeding Mr. Kinch. Effective Nov. 1.

New York, Philadelphia & Norfolk.—R. K. Cassatt has been elected a Director, succeeding U. H. Painter, deceased.

Pacific Coast.—The position of Superintendent of Rail Lines in Washington, is abolished, and J. C. Ford has been appointed Assistant General Manager, with headquarters at Room 326, Burke Building, Seattle, Wash., effective Nov. 5.

Paragould Southeastern.—Oliver Gailbraith has been appointed Master Mechanic, with headquarters at Paragould, Ark.

Pecos Valley & Northeastern.—Frank P. Morgan, General Live Stock Agent, has resigned.

Pennsylvania Company.—D. S. Gray, General Agent at Columbus, Ohio, will be retired under the provisions of the new pension bureau to be put in operation on this system.

Peoria & Pekin Terminal—Paul Rankin has been appointed Auditor, succeeding O. M. Easton.

Seaboard Air Line.—The jurisdiction of A. Pope, Assistant General Freight Agent, has been extended to include the entire territory of the Fourth and Fifth Divisions, with headquarters at Savannah, Ga., effective Nov. 15.

Toledo, St. Louis & Western.—J. H. Mace, heretofore with the St. Louis & San Francisco, has been appointed Superintendent of Terminal of the T., S. L. & W.

Water Valley, Clarksdale & Mississippi Valley.—The officers of this company referred to in the Construction

column are: Chairman, Z. D. Jennings, Water Valley; Secretary, G. D. Able, Water Valley; Treasurer, J. W. Cutrer, Clarksdale, Miss.

Wrightsville & Tennille.—R. A. Moore has been appointed Master Mechanic, with headquarters at Tennille, Ga., succeeding J. H. Green, resigned.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ALPENA, GAYLORD & WESTERN.—This company, entered last as the Alpena & Western (Oct. 26, p. 711), is getting rights of way and surveying for its line from Alpena, Mich., west across the State about 100 miles via Long Rapids, Hillman, Atlanta, Gaylord, Mancelona, Bellaire and Traverse City to Frankfort. Wm. M. Durand, of Ann Arbor, is President, and Wm. H. Leroy, of Alpena, Engineer. (Official.)

ARKANSAS SOUTHERN.—The extension from Ruston, La., south toward Sabine City, Tex., is reported located as far as Winfield, 45 miles, and grading and track laying are in progress. C. C. Henderson, of Junction City, Ark., is General Manager. (Construction Supplement, July 27, 1900.)

ATCHISON, TOPEKA & SANTA FE.—Building is reported begun on grade reduction between Kansas City and Emporia. (Aug. 24, p. 574.)

ATHENS, NELSONVILLE & HOCKING VALLEY TRACTION.—Application is to be made to incorporate this electric line in Ohio, to run from Athens northwest about 20 miles via Chauncey and Nelsonville to Murray, paralleling the Hocking Valley, with a branch from Chauncey north about 15 miles via Millfield, Jacksonville and Trimble to Glouster. Among those interested are H. H. Homing, Athens; Thomas A. Selz, S. R. Pine, H. C. Haning and Robert Klein, Dayton.

ATLANTA, KNOXVILLE & NORTHERN.—A branch is reported building from Apalachia to the property of the Apalachia Land & Lumber Co. in the North Carolina mountains.

BALTIMORE & OHIO.—With reference to a branch from a point on the main line in Maryland, a few miles west of Piedmont, W. Va., to run north up the Savage River, an officer writes that a siding will be built at that point some time in the near future, but nothing will be done toward an extension. (Nov. 9, p. 748.)

BUTTE, ANACONDA & PACIFIC.—Right of way is reported being obtained for an extension at the East Anaconda, Mont., yards to smelting works, 1.93 miles.

CANADIAN PACIFIC.—Spurs are to be built at once, according to report, at Greenwood, B. C., to the Standard Pyritic Company's smelter and to the Old Ironside mine.

CHICAGO & NORTHWESTERN.—A branch is to be built, according to report, from Nelson, Ill., on the main line, to run south about 84 miles via Walnut to Peoria.

CHICAGO, IOWA & DAKOTA.—Captain T. P. Gere, of Sioux City, Iowa, President, and D. C. Shull, General Counsel, have been in Chicago recently making arrangements for financing this proposed line from St. Louis, Mo., north 480 miles to Sioux City, Iowa, and thence to the Dakotas. They hope to complete arrangements for beginning the work this year. (Aug. 3, p. 531.)

CHICAGO, ROCK ISLAND & PACIFIC.—The company has bought land adjoining its depot and yards at Des Moines, Iowa, which will be used for extending the freight yards.

CUBA COMPANY.—Building is reported begun on the line which is to connect the east and west ends of the Island of Cuba. The work is said to be in progress at Santa Clara, the present terminus of the Western end of the railroad systems, and the line is to run east about 350 miles to Santiago. The company is said to have acquired an option on the road running from Santiago to the mines of the Ponupo Manganese Ore Co., which is to form a link in the proposed line. Sir Wm. Van Horne, Chairman of the Board of Control of the Canadian Pacific, is President, and Wm. Redmond Cross, of the Morton Trust Co., New York, Treasurer. (Construction Supplement, July 27, 1900.)

GLASGOW.—This Company was incorporated in Pennsylvania, Nov. 12, with a capital stock of $7,500, to build a railroad three-fourths of a mile long in Ohio Township, Beaver County.

ILLINOIS SOUTHERN.—An officer confirms the report that the company is making surveys and examinations to determine the cost and desirability of an extension about 40 miles into Missouri, opposite Chester, Ill. As yet nothing is determined. (Nov. 2, p. 732.)

INDIANA & OHIO ELECTRIC.—Building is to be begun at once, according to report, on this electric line from Muncie, Ind., to Bluffton, Wells County. J. M. Gore, of Indianapolis, Ind., is the promoter. (Construction Supplement, July 27, 1900.)

INTER-MOUNTAIN.—Financial arrangements are about completed for making what is practically an extension of the Kishacoquillas Valley from Belleville, Pa., to run northwest about 15 miles to McAlavy's Fort, Huntingdon County. Surveys will be begun during the present month and everything done to have the road ready for building by April 1 next. Probably no contracts will be let for any of the work. The parent company will set aside certain of its earnings as a guarantee for interest on bonds of the Inter-Mountain. F. F. Whittekin will be trustee for the bonds which will be covered by a general mortgage on all the property. (Construction Supplement, July 27, 1900.) The Greenwood Furnace will be served by the new line. (Official.)

KISHACOQUILLAS VALLEY.—This line which runs from Belleville, Pa., on the Pennsylvania R. R., to Reedsville, 9.2 miles, is being extended from Reedsville to Lumber City. This will require a three-span bridge over the Kishacoquillas Creek near Reedsville. A "Y" will be built at Reedsville and another at Belleville. Other permanent improvements will be made in the immediate future. The property is controlled by F. F. Whittekin, General Manager and Consulting Engineer of the Ferro-Carril de Antioquia Colombia, S. A., and now at Tionesta, Pa. Dr. J. P. Getter, of Belleville, Pa., is General Manager. See also Inter-Mountain above. (Official.)

LAFAYETTE & CARENCRO.—This company has been organized in Louisiana, with a capital stock of $10,000, to build a railroad from Lafayette north to Bayou Carencro. Isidore Hechinger and Simon Grumbel, of Lafayette, are interested.

LOS ANGELES & SALT LAKE.—This company is being organized and is soon to be incorporated, according to report, for the proposed line in which the Los Angeles Terminal is interested, from Los Angeles, Cal., northeast about 700 miles via San Bernardino to Salt Lake City, Utah. It is said that the capital stock is to be $24,000,000. Surveys have been made, according to report, at both ends of the line. Senator W. A. Clark, of Montana, is to be President, according to report; R. C. Kerens, of St. Louis, Vice-President, and T. E. Gibbons, of Los Angeles, Chief Counsel. (Los Angeles Terminal, Sept. 7, p. 602.)

MANSFIELD SHORT LINE.—C. E. Loss & Co., of Chicago, contractors, are reported having resumed work at Mansfield, Ohio, on this new line from Shelby, Ohio, northwest to Mansfield. Several miles is reported graded. C. W. French, of Mansfield, is President. (Aug. 17, p. 560.)

MARQUETTE & SOUTHEASTERN.—Building is reported begun on this line of the Cleveland-Cliffs Co., of Cleveland, Ohio, from Marquette, Mich., southeast 27 miles. The first work is on a bridge over the Dead River. Wm. G. Mather, of Cleveland, is President and Treasurer, and H. R. Harris, Marquette, General Manager. (Oct. 26, p. 712.)

MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.—An officer confirms the report that the company is contemplating building a short line up through Polk County, Wis., but has no intention of building on to Duluth or Superior. (Nov. 2, p. 732.)

MISSISSIPPI ROADS.—The Ellisville Lumber Co., of Ellisville, confirms the report that it is building a railroad from Ellisville toward Williamsburg. This is a logging road to the company's mill only. At some future time the road may be extended to Williamsburg, but not at present. (Nov. 2, p. 732.)

MOUNTAIN VALLEY & BAKERSFIELD.—This company has been incorporated in California, with a capital stock of $600,000, to build a railroad in Kern County from Bakersfield northwest 60 miles. The principal office is Bakersfield. The incorporators are: C. A. Lee, J. L. Carson, I. L. Miller, P. L. Budinger and R. H. Stevens.

NEW YORK & OTTAWA.—An officer writes that the company is not making any extension south of Tupper Lake, N. Y., nor does it contemplate doing so as reported. (Nov. 2, p. 732.)

NEW YORK CENTRAL & HUDSON RIVER.—The directors have authorized the double tracking of the Harlem Division between White Plains and Mount Kisco, above New York City.

NORTHERN PACIFIC.—Building is to be begun at once, according to report, on the cut-off from Ellensburg, Wash., east about 100 miles to Lind. The line now runs via Pasco, 190 miles. Surveys were made some months ago. (Aug. 24, p. 574.)

PECOS VALLEY & NORTHEASTERN.—An officer confirms the statement that the company has incorporated the El Paso, Pecos Valley & Eastern to build its extension to El Paso, Tex. The line is to run from a point about 28 miles south of Roswell southwest 170 miles to El Paso. No details are at present available as to building, though the company expects to be actively engaged within the next two or three months. (Nov. 2, p. 732.)

PEORIA & NORTHWESTERN.—This company was incorporated in Illinois, Nov. 9, by officers of the Chicago & Northwestern, to build a proposed line from Peoria north to Nelson on the main line, referred to above.

ST. LOUIS & SAN FRANCISCO.—Surveys are reported in progress for the extension of the Chadwick branch from Chadwick, Mo., south to Harrison, Ark., to connect with the extension building from Eureka Springs.

SOUTHERN INDIANA.—An officer writes that there is no truth in the report that the company will build a branch from Jasonville, Ind., to Terre Haute. The engineers have been looking over the ground which no doubt led to the report. (Nov. 9, p. 748.)

SOUTHERN PACIFIC.—Work is reported begun on the cut-off across the north arm of Salt Lake, Utah, east 107 miles to Ogden. (Construction Supplement, July 27, 1900.)

WATER VALLEY, CLARKSDALE & MISSISSIPPI VALLEY.—Preliminary surveys are reported begun under Capt. H. P. Farrar on this proposed line from Water Valley, Miss., on the Illinois Central, to run northwest about 70 miles via Riverside to a point on the Mississippi opposite Helena, Ark. This is probably the same line as that noted recently under Water Valley & Helena, in which W. C. Bryant, of Water Valley, is interested. The officers of the W. V., C. & M. V. are given under elections and Appointments. (Construction Supplement, July 27, 1900.)

WISCONSIN MIDLAND.—This company has been incorporated in Wisconsin, with a capital stock of $25,000, to build an electric railroad from Berlin north about 35 miles via Poysippi west about 20 miles to Wautoma. The incorporators are: Wm. C. Lawrence, and Chas. C. Pierce, of Chicago, and A. L. Hutchinson, W. H. Reed and E. H. Jones, of Weyauwega.

GENERAL RAILROAD NEWS.

ARKANSAS & OKLAHOMA.—The St. Louis & San Francisco, according to report, is to take over the control of this property. The line runs from Rogers, Ark., to Southwest City, Mo., 36.5 miles, and an extension is building from Southwest City via Grove, Ind. T., to Grand River, 16½ miles, of which two miles was completed at last report. (Construction Supplement, July 27, 1900.)

ATCHISON, TOPEKA & SANTA FE.—The stockholders will vote, Dec. 13, on the propositions to buy the property and franchises of the San Francisco & San Joaquin Valley, the Santa Fe Pacific and various other lines, branches, etc. The object is to confirm the several purchases which have been set forth in the annual reports hitherto issued by the stockholders, and is in accordance with the policy to unify the system. (July 28, 1899, p. 548.)

ATLANTA & WEST POINT.—The Atlanta Belt Line, a subordinate company, has authorized the issue of $500,000 stock, of which $400,000 is outstanding. No bonds have as yet been issued. The line will be completed and turned over to the operating department about Dec. 1. (Sept. 21, p. 629.)

BOSTON & ALBANY.—Stockholders of the New York Central & Hudson River, on Nov. 8, approved of the final adoption of the lease of the B. & A., and the leasing company took possession Nov. 10. Wm. Bliss, President of the B. & A., has been appointed agent to operate the road for account of the Central. (Oct. 5, p. 662.)

CERRILLOS COAL.—Upon application of W. E. Hodges, of Chicago, trustee for the bondholders, Judge McFie, at Santa Fe, N. Mex., on Nov. 9, appointed James E. Hurley Division Superintendent of the Atchison, Topeka & Santa Fe, at Las Vegas, Receiver of the Cerrillos Coal Co. This line extends from Waldo, N. Mex., on the Atchison, to the coal mines of the Cerrillos Fuel & Iron Co., at Madrid.

CHICAGO & NORTHWESTERN.—An officer denies the report that his company is negotiating for the control of the Marshfield & Southeastern. (Nov. 9, p. 748.)

CHICAGO, BURLINGTON & QUINCY.—The stockholders, on Nov. 7, ratified the purchase of the Iowa and Missouri lines operated under leases. (Oct. 26, p. 712.)

CINCINNATI, HAMILTON & DAYTON.—At a special meeting of the stockholders, called for Dec. 11, a proposition will be considered to refund the bonds into 4 per cents.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—Seven Cincinnati, Indianapolis, St. Louis & Chicago consolidated 6 per cent. mortgage bonds have been drawn for payment at 105 and accrued interest on May 1, 1901, interest to cease at that date.

MARIETTA, COLUMBUS & CLEVELAND.—See Toledo & Ohio Central Extension.

MEXICAN NORTHERN.—The Morton Trust Co., New York, as trustee, under the first mortgage, has at its disposal in the sinking fund $29,768.61, and offers to buy first mortgage bonds at not to exceed 105 and accrued interest. Sealed offers will be received up to noon, Nov. 26. (May 4, p. 296.)

NEW YORK CENTRAL & HUDSON RIVER.—The gross earnings of this company and its leased lines for the quarter ended Sept. 30, 1900, were $14,673.575, against $14,184,393 in 1899. The net earnings were $5,706,021, against $5,712,820. The balance available for dividends this year's quarter is $2,547,940, or 2.22 per cent. on the $115,000,000 capital stock, against $2,588,371, or 2.56 per cent. a year ago on $100,000,000. Dividends of 1¼ per cent. have been paid, requiring $1,437,500, leaving a surplus of $1,110,440.

The directors, on Nov. 9, authorized the issue of $5,500,000 of 3½ per cent. 100-year debenture bonds, as provided in the Boston & Albany lease, to pay for certain real estate, etc. The lease bill provides for an expenditure of $2,500,000 ($500,000 annually for five years) for the improvement of docks and terminal facilities at East Boston. (See also Boston & Albany above.)

NORTHERN PACIFIC.—The voting trustees, on Nov. 12, gave notice that the voting trust would be dissolved on Jan. 1, 1901, although under the reorganization agreement the dissolution was to take effect Nov. 1, 1901. All stock certificates are to be exchanged for stock of the company on and after Jan. 2. The road went into the hands of the trustees under the reorganization in September, 1896. (March 30, 1900, p. 210

The directors, on Nov. 8, declared a dividend of 1 per cent. on the common stock and resolved that hereafter dividends shall be declared quarterly. This places the common stock on practically a 4 per cent. basis.

PACIFIC COAST—According to the annual report, the gross earnings for the year ended June 30, were $5,291,443; the operating expenses, $3,830,192. After deducting interest, etc., the net balance was $973,114. Dividends amounting to $535,936 were paid, leaving a surplus of $437,178. The total profit and loss credited on June 30 last was $1,045.328. The deductions from income include $200,000 for steamship depreciation, as well as renewal charges on other accounts, including rolling stock, etc. The report states that the rapid development of the West will require improvements, and new modern ships and other transportation facilities are being provided.

PENNSYLVANIA.—Sealed proposals will be received until 3 p. m., Nov. 30, at the office of the Provident Life & Trust Co., Philadelphia, for the sale of as many 4½ per cent. collateral trust bonds at $121,100 will pay for at not to exceed par, interest to cease Dec. 1.

PEORIA, DECATUR & EVANSVILLE.—Judge Baker, of the Federal Court, at Indianapolis, Ind., Nov. 1, confirmed a decree of the U. S. Court of the Southern District of Illinois, authorizing E. O. Hopkins, Receiver, to turn over to the Clerk of the Indiana Court the balance of the funds of the road in his hands, amounting to $6,178.30. (Sept. 21, p. 628.)

SEABOARD AIR LINE.—John L. Williams & Sons, Richmond, Va., are offering the following securities of this company and its subordinate lines: Two-year 5 per cent. gold bonds of the S. A. L., dated Oct. 1, 1900, at 98 and interest; Georgia & Alabama first mortgage consolidated 50-year gold 5s, dated Oct. 1, 1895, at 96 and accrued interest; Georgia & Alabama Terminal first mortgage 50-year gold 5s, dated Dec. 1, 1898, at 100 and accrued interest; South Bound first mortgage 50-year gold 5s, dated 1891, at 99 and interest.

SEATTLE & SAN FRANCISCO RAILWAY & NAVIGATION.—This company and the Green River Construction Co. were placed under R. F. Guerin as temporary receiver on Nov. 2. The application for receivership was made by Mr. Guerin on behalf of himself and other stockholders who were alleged to have advanced over $100,000 to each of the companies to aid in building and developing the property. (Oct. 27, 1899, p. 754.)

SOUTHERN PACIFIC.—This company has acquired a controlling interest in the capital stock of the Pacific Mail Steamship Co., through Speyer & Co., New York. The proposition of Speyer & Co. is accepted to buy $10,000,000 of 25-year 4½ per cent. gold bonds of the Southern Pacific secured by control of the Pacific Mail and by stocks and bonds of other companies.

TOLEDO & OHIO CENTRAL EXTENSION.—This company has been reorganized under the title of the Marietta, Columbus & Cleveland. Notice of the incorporation of the new company appeared in a Railroad Construction column for Oct. 26, p. 712. The transfer took effect Nov. 1.

TREDEGAR MINERAL.—A deed was filed at Anniston, Ala., Nov. 3, transferring all the rights of this property to the East & West of Alabama. The line runs from Jacksonville, Ala., to Tredegar Junction, four miles. (May 18, p. 330.)

UNION PACIFIC.—Judge Walter H. Sanborn, of the U. S. Circuit Court at St. Paul, Minn., issued an order, Nov. 7, approving the final report of the successory receivers and finally discharging them. (Oct. 26, p. 712.)